Chapter Four

Options for National Defense

The advent of the Bush Administration has sharpened the debate over military programs and the defense budget. Pentagon leaders are conducting a new Quadrennial Defense Review (QDR) that will examine the implications for military forces of the Administration's national security strategy. The results of that review are scheduled to go to the Congress in September. Meanwhile, the Secretary of Defense has initiated other reviews of defense programs—including major acquisition programs—and the defense budget.

This chapter summarizes some of the major defense issues likely to be debated during the 107th Congress and the arguments on both sides of those issues. It also presents various options for change that reflect the proposals of advocates from different parts of the policy spectrum, together with the advantages, disadvantages, and budgetary impact of those options. As the introduction to this volume noted, the Congressional Budget Office is a nonpartisan support agency of the Congress and does not make recommendations about policy. Thus, CBO neither endorses nor opposes any of these options.

Spending for national defense is included in function 050 of the federal budget (see Table 3). Although about 95 percent of that spending falls within

Table 3.
Federal Spending for Budget Function 050, Fiscal Years 1990-2001 (In billions of dollars)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Estimated 2001
Budget Authority (Discretionary)	303.9	332.2	299.1	276.1	262.2	262.9	265.0	266.2	272.4	288.1	301.2	311.1
Outlays												
Discretionary	300.1	319.7	302.6	292.4	282.3	273.6	266.0	271.7	270.2	275.5	295.0	301.4
Mandatory	-0.8	-46.4	-4.3	-1.3	-0.6	-1.5	-0.2	-1.2	-1.8	-0.6	-0.5	-0.8
Total	299.3	273.3	298.4	291.1	281.6	272.1	265.8	270.5	268.5	274.9	294.5	300.5
Memorandum:												
Annual Percentage Change in Discretionary Outlays	n.a.	6.5	-5.3	-3.4	-3.5	-3.1	-2.8	2.1	-0.5	1.9	7.1	2.2

SOURCE: Congressional Budget Office.

NOTE: n.a. = not applicable.

the Department of Defense (DoD), function 050 also includes the atomic energy activities of the Department of Energy and smaller amounts in the budgets of other federal departments and agencies. CBO estimates that discretionary outlays for function 050 will total about $301 billion in 2001. (Mandatory spending in that function is negative primarily because of offsetting receipts from the sale of excess military equipment. Offsetting receipts were unusually large in 1991 because of reimbursements by foreign governments for some of the costs of the Persian Gulf War.) By CBO's estimate, 2001 will mark the third straight year in which defense spending has grown in nominal terms (not accounting for inflation).

Introduction

Developing an appropriate budget for defense depends on addressing far-reaching questions about threats, strategy, and forces. In reviewing the new Administration's plans for defense, Members of Congress are likely to focus on these questions:

- Is the Administration's national security strategy an appropriate response to likely threats to U.S. security?
- Will the military forces and modernization programs planned by DoD adequately support that strategy?
- Will the budget that the Administration proposes be sufficient to maintain those forces and carry out those plans?

All three of those questions are useful for evaluating U.S. military forces and the funding necessary to maintain them.

Current Threats

The U.S. military today has no peer. Some Russian and Chinese conventional weapons and forces may equal those of the United States in number. In a few cases, Russian or Chinese forces may even be numerically superior. But the capabilities of the U.S. military far surpass those of other nations if factors such as training, readiness for combat, sophistication of weapons, and availability of linked communications and intelligence networks are taken into account.

Much of today's defense planning focuses on the threats posed by certain regional powers that are antagonistic to U.S. interests. Iran, Iraq, and North Korea are the nations of greatest concern, although they have substantially fewer forces than either Russia or China, let alone the United States. Their forces are also no match for U.S. troops and equipment in many of the other dimensions of combat capability noted above.

More worrisome, according to the intelligence community and many military leaders, may be unconventional threats—such as nuclear, biological, and chemical weapons, which can have enormous destructive capacity. The regional powers of concern to U.S. analysts may be developing or expanding their stocks of such weapons. Moreover, threats to use unconventional weapons could come from hostile individuals or groups as well as nations. The United States' superior conventional forces and weapons would be of limited value in a regional war if an enemy's threat to retaliate with weapons of mass destruction deterred the United States from using its conventional arms. Adversaries could also target the Internet and seek to disrupt commercial and military computer networks, on which the United States and DoD increasingly rely. Such threats are difficult to counter, in part because most current U.S. weapons are focused on more conventional threats.

National Security Strategy

In recent years, the national security strategy has rested on a policy of engagement in the world's affairs—in peacetime as well as during crises. Consequently, that strategy has directed the U.S. military to be ready to undertake activities ranging from limited humanitarian missions to full military campaigns against capable, well-equipped regional foes.

The makeup of today's combat forces is driven by a goal of being ready to fight two regional wars occurring at about the same time. That objective determines the size and structure of most types of

forces. But the recent national security strategy has also expanded the military's involvement in smaller-scale contingency operations during peacetime (operations such as peacekeeping, peace enforcement, humanitarian assistance, and hostage rescue).[1] That part of the strategy has added to the military's operating costs in peacetime and increased the demands on military personnel—both through additional deployments and through greater need for some types of forces specifically associated with those operations, such as civil affairs personnel and military police.

Another factor that affects U.S. military actions and budgets is the desire of decisionmakers to minimize casualties, a desire that has increased over the past several decades. That attitude may affect the nature of the forces that military leaders use—for example, air rather than ground forces. It may also lead to increases in the number of forces that DoD maintains, because, the military argues, greater U.S. superiority can shorten wars and reduce U.S. casualties.

Besides meeting current demands, the national security strategy directs that the services prepare for the demands of the future. The plans that DoD develops for that purpose attempt to consider the evolution of military technology, the proliferation of more-sophisticated weapons (including weapons of mass destruction and the means to deliver them), and the possible emergence of a nation with military capabilities that rival those of the United States. DoD has used those considerations to justify its plans for modernization and its development and procurement of new weapons.

Concerns About Military Readiness

The chiefs of the military services have testified on numerous occasions to the Congress about the difficulties they face in keeping their troops ready for combat. They argue that the recent pace of peacetime operations, coupled with reductions in the number of forces, is hurting readiness for conventional war. The service chiefs cite four main concerns with readiness.

- *Recruitment and Retention*. The military is having trouble retaining experienced officers and enlisted personnel in certain specialties, such as pilots and crew chiefs in the Air Force.

- *Material Readiness*. Mission-capable rates (the percentages of equipment ready for action) have declined for many units, partly because of shortages of spare parts.

- *Overseas Deployments*. According to the service chiefs, the pace of overseas deployments was significantly greater in the 1990s than during the Cold War era. That increase has placed particular stress on "high-demand/low-density" units. More frequent deployments have also necessitated the call-up of reserve units—entire reserve divisions have been deployed to peacekeeping missions in Bosnia—as well as the use of individual volunteer reservists to support those missions.

- *Quality of Life*. Several factors have had an adverse impact on the quality of life for military families, the chiefs say. One is increased time away from home as a result of more frequent and longer deployments. Another is aging and poorly maintained facilities and family housing units for military personnel.

Today, the level of funding for operation and maintenance—the type of appropriation that contributes most directly to readiness by paying for training, fuel, and maintenance depots—is actually higher per active-duty service member than it was when the post-Cold War force reductions began. Nonetheless, readiness may still be suffering for a number of reasons. First, DoD's involvement in smaller-scale contingency operations may mean large hidden costs in terms of wear and tear on equipment. Second, today's smaller force may require higher spending per capita than a larger force. (For example, certain costs, such as satellite reconnaissance, are fixed and do not fall with the number of active-duty personnel.) Third, aging equipment may be adding to the cost of maintenance. And fourth, DoD may have been unable or unwilling to give up costly business practices

1. Smaller-scale contingencies (a term used by the Office of the Secretary of Defense) correspond to what CBO and other military analysts previously referred to as operations other than war.

and facilities from the Cold War era. For example, it has not reduced its base structure commensurate with the reduction in forces and personnel. DoD estimates that by 2003, its base structure will be 21 percent smaller than in 1989, whereas its forces will be 36 percent smaller. Even after four rounds of base realignments and closures—the last begun in 1995—DoD retains a system of equipment maintenance depots with much greater capacity than it requires. In addition, it keeps a peacetime medical establishment far greater than its wartime requirements.

Responses by the Clinton Administration and the 106th Congress

Responding to the concerns of the service chiefs, the Clinton Administration in December 1998 added $112 billion to its defense plan for fiscal years 2000 through 2005. (Of that $112 billion, $84 billion represented a real increase from the previous year's plan; the rest represented an increase made possible by lower projected inflation.) That funding was added to enable DoD to boost compensation for service members, provide more support for both readiness and modernization priorities, and fund the expected costs of supporting U.S. forces deployed to Bosnia and the Persian Gulf region.

The 106th Congress also responded to concerns about the military. It increased defense appropriations above the Administration's requests for both fiscal years 2000 and 2001. For 2000, the Congressional budget resolution set the ceiling for budget function 050 at $290.0 billion in discretionary budget authority—some $8.3 billion more than the Administration had requested. The final defense appropriations for 2000, including supplemental funding, totaled $301.2 billion.[2] For 2001, the Administration requested $306.3 billion for national defense. The Congress increased that amount by some $4.8 billion, to $311.1 billion.

The Congress had three main priorities in providing that level of funding. First and foremost was ensuring the ability of U.S. forces to meet their commitments worldwide. To further that goal, the Congress increased funds directed at supporting the readiness of personnel, modernizing forces, and researching and developing new weapon systems.

A second Congressional goal was to counter future threats to national security. Resources were added to combat emerging threats—such as the proliferation of nuclear, chemical, and biological weapons and the means to deliver those weapons against U.S. allies or the United States itself.

The Congress's third major goal was to provide service members with a compensation package that would enable DoD to meet its requirements for personnel. The Congress provided for a series of pay raises that exceed the projected rate of increase in private-sector wages. It also increased retirement benefits for military personnel who entered the armed forces after 1986. Finally, the Congress made significant changes in the military health care system to improve benefits and reduce costs for its users, especially older military retirees and their families.

The Structure of This Chapter

Recent Congressional actions by no means represent the last word on the U.S. defense budget. The major issues likely to be debated by the 107th Congress fall into three main categories:

- Sizing and shaping military forces to match their peacetime and wartime missions;
- Modernizing weapon systems and countering emerging threats; and
- Providing the personnel, equipment, and facilities that the military needs.

Each of those categories is the subject of a section in this chapter. The sections summarize the issues and present various options for change. Each option provides general background information, discusses the pros and cons of the change, and estimates the savings or costs during the 10-year period from

2. Appropriations for the budget function for national defense are provided mainly through three appropriation acts: the ones for national defense, military construction, and energy and water (which provides funds for atomic energy activities of the Department of Energy).

2002 to 2011. (As noted above, the inclusion or exclusion of a specific option does not represent an endorsement or rejection of that option by CBO.)

Sizing and Shaping U.S. Forces to Match Their Missions

In today's world, the U.S. military faces two main tasks: preparing for war against a major regional power and participating in smaller-scale contingency operations. This section presents options for reshaping military forces to better match those tasks. The dramatic reduction in forces that occurred during the 1990s makes determining the best size and shape of the forces that remain a paramount concern for the military.

In 1989, the Department of Defense had 2.2 million active-duty military personnel, 1.2 million selected reserve personnel organized into units, and 1.1 million civilians working for the military departments and defense agencies. After the collapse of the Soviet Union and the Warsaw Pact, DoD cut its active-duty personnel by 745,000, or 35 percent. Moreover, between 1989 and 2000, the Army went from 18 active divisions to 10, the number of battle force ships in the Navy declined from 566 to 316, and the Air Force reduced the number of tactical-fighter-wing equivalents in its active forces from 25 to 13 (see Table 4).

The reserve components of the services also experienced reductions over that period. Their overall cut amounted to 26 percent between 1989 and 2000, but among the individual reserve components, the reductions varied greatly. The Army Reserve and Navy Reserve saw the largest cuts—36 percent and 40 percent, respectively. The Army National Guard was reduced by 23 percent between 1989 and 2000. The other reserve components were cut by much smaller percentages during that period: 9 percent for the Marine Corps Reserve, 8 percent for the Air National Guard, and 11 percent for the Air Force Reserve. Those three reserve components are arguably the ones most highly valued by their service leaders and the best equipped and most ready for combat.

To some extent, each military department attempted to shape its post-Cold War force to the new security environment by making selective cuts to its combat forces. The Air Force, for example, reduced tactical (short-range) fighter forces by more than 45 percent but made smaller reductions in its airlift forces (which transport troops and equipment). The Navy cut the number of attack submarines by almost 47 percent but the number of surface combat ships by a much lower percentage. Even so, some critics argue that the remaining forces are still oriented toward fighting a major conflict from prepared positions and bases rather than being the mobile forces required for today's unstable world. As a result, many military analysts maintain that more radical changes are necessary in the way forces are organized for deployment and combat.

Conventional Conflict Against a Major Regional Power

The basic scenario that U.S. military planners have adopted for shaping conventional forces today is a conflict with a major regional power. Although the standard examples of such a power are Iraq and North Korea, planners assume that major wars that might require the United States to use force could erupt in other regions or against other powers. The Clinton Administration's 1993 Bottom-Up Review and 1997 Quadrennial Defense Review both assumed that U.S. conventional forces (with some help from regional allies) must be sized to fight such wars occurring "in two theaters in overlapping time frames."[3] The 1997 QDR also assumed that some U.S. forces would be engaged in other missions, such as peacekeeping, and might need to extricate themselves from those missions and regroup before taking part in a major theater war.

The 1997 QDR defined the requirements for conventional forces as including 10 active Army divisions; three active Marine expeditionary forces (MEFs), each consisting of a division, an air wing, and support and command elements; 12 aircraft carrier battle groups and 12 amphibious ready groups in the Navy; and at least 12 active Air Force fighter

3. Secretary of Defense William S. Cohen, *Report of the Quadrennial Defense Review* (May 1997), p. 31.

wings (or their equivalents). Requirements for reserve forces included about 40 Army brigades (some of which are organized into eight divisions), one MEF, one of the 12 aircraft carriers, and eight wings of Air Force tactical fighters. A significant part of the Air Force's and Navy's long-range airlift aircraft and sealift ships are also in the reserves.

According to the 1997 QDR, various types of units are not numerous enough to support two overlapping major theater wars. Those units include long-range bombers, stealth tactical bombers (F-117s), electronic warfare aircraft, airborne warning and control aircraft, Joint Surveillance Target Attack Radar System aircraft, special-operations forces, and some amphibious assault forces. Planners assume that those assets could shift from one theater to the other as the situation demanded.

The 1997 QDR conducted a more thorough review of force requirements than its predecessor, the Bottom-Up Review, but it too received criticism. Some critics felt that its force cuts were far smaller than the current national security situation permitted.

Table 4.
U.S. Military Forces in Selected Fiscal Years, 1989-2000

	1989	1993	1995	1997	2000
Strategic Forces					
Land-Based Intercontinental Ballistic Missiles	1,000	787	585	580	550
Heavy Bombers	263	194	140	126	152
Submarine-Launched Ballistic Missiles	576	408	360	408	432
Conventional Forces					
Land Forces					
Army divisions[a]					
Active	18	14	12	10	10
Reserve	10	8	8	8	8
Marine Corps divisions[b]	4	4	4	4	4
Naval Forces					
Battle force ships	566	435	372	354	316
Aircraft carriers					
Active	15	13	11	11	12
Reserve	1	0	1	1	0
Aviation Forces					
Air Force fighter-wing equivalents					
Active	25	16	13	13	13
Reserve	12	11	8	7	8
Navy carrier air wings					
Active	13	11	10	10	10
Reserve	2	2	1	1	1
Airlift aircraft					
Intertheater	401	382	374	345	308
Intratheater	492	380	428	430	425

SOURCE: Congressional Budget Office using data from Office of the Secretary of Defense, *Annual Report to the President and the Congress* (various years).

a. Excludes separate brigades.

b. Includes one reserve Marine Corps division.

They argued that a different planning scenario—say, one major theater war and one smaller-scale contingency operation—would have allowed much larger reductions in military and civilian personnel. Other critics argued that the military had already been cut too far and that the 1997 QDR failed to analyze alternatives that would add to forces.

Some of the options below would increase forces that may be limiting factors in major theater wars, that provide U.S. presence overseas, or that are ready to respond to crises. Other options would reduce certain forces—both active and reserve—that some critics believe are larger than needed to deal with future threats.

Option 050-01
Increase the Attack Submarine Force to 68

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	2,640	190
2003	3,870	720
2004	3,080	1,460
2005	2,690	2,040
2006	2,810	2,520
2002-2006	15,090	6,930
2002-2011	21,050	18,000

RELATED CBO PUBLICATION:

Budgeting for Naval Forces: Structuring Tomorrow's Navy at Today's Funding Level (Study), October 2000.

In the 1997 Quadrennial Defense Review, then Secretary of Defense William Cohen called for reducing the Navy's force of attack submarines to 50. According to some Navy officials, the size of that force is being determined not by operational requirements but by budget constraints. Indeed, Navy officials say today's force of about 56 submarines is already overworked: the number of intelligence and surveillance missions, which are the principal job of submarines in peacetime, has doubled since the end of the Cold War, while the size of the force has fallen by 40 percent. As a result, the Navy's leadership argues, there are no longer enough submarines to perform all of the missions required of them. Moreover, according to Navy officials, the intelligence missions that submarines perform generally cannot be carried out by any other U.S. intelligence-gathering asset.

This option would increase the attack submarine force to 68 and maintain it at that size indefinitely—at a cost of $2.6 billion in budget authority in 2002 and $21 billion over 10 years. In a recently released study, the Joint Chiefs of Staff asserted that the Navy needs a fleet of 68 submarines by 2015 to fulfill the peacetime and wartime tasks that the unified commands have set for attack submarines.

To achieve the force reduction mandated by the 1997 QDR, the Navy has been deactivating submarines before the end of their useful service life, which is 30 to 33 years. Under its current schedule, seven Los Angeles class submarines would be deactivated between 2001 and 2008. If instead the Navy refueled those submarines and kept them until they reached 33 years of age, the Navy could retain a larger force.

Nevertheless, to reach a force of 68, the Navy would also need to build three or four submarines a year beginning in 2003 and continue at that pace beyond 2011. (That would give the Navy 68 attack submarines by 2012.) By contrast, the Navy's budget request for 2001 envisioned building one submarine a year between 2001 and 2006 and two or three a year between 2007 and 2011. Building three or four submarines a year would compensate for the decommissioning of Los Angeles class submarines as they reached the end of their service life. (Those submarines were funded during the 1970s and 1980s at rates of two to four a year.) In the very long run, to sustain a force of about 68 submarines, the Navy would need to build an average of two and one-quarter submarines a year.

Although this option would allow the Navy to meet its requirements, the costs would be high. Compared with the Navy's current plans, this option would buy an additional 12 Virginia class submarines

between 2002 and 2011 at an added cost of $19 billion in procurement spending. (Option 050-29, by contrast, would reduce procurement of the Virginia class submarine.) Refueling three Los Angeles class submarines would cost another $1 billion (CBO assumed that the other four Los Angeles class subs would be refueled with funds already programmed for that purpose). Operating costs for the additional submarines of both classes would total another $1.2 billion through 2011.

Not everyone would agree that the Navy needs a fleet of 68 submarines. Besides the 1997 Quadrennial Defense Review, other Department of Defense studies with different priorities and planning factors have concluded that a smaller force would be sufficient. The 1993 Bottom-Up Review stated that 45 to 55 submarines were enough to meet peacetime and wartime requirements, although it qualified that finding by saying the smaller number might be too low for peacetime. However, the report did not specify how it determined those force levels. The 1997 QDR, which argued that the submarine force could shrink because of reduced requirements, also did not specify which requirements were being reduced.

Other analysts have argued that the attack submarine force could be even smaller than the level set by the 1997 QDR. For example, according to a study by the Cato Institute, the United States needs only 25 submarines because of reduced threats in the post-Cold War period. That study argued in favor of substantially curtailing the fleet's mission of overseas presence and not assigning attack submarines to support aircraft carrier battle groups. □

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	0	0
2003	0	0
2004	0	0
2005	1,730	120
2006	1,760	420
2002-2006	3,490	540
2002-2011	6,650	5,270

RELATED CBO PUBLICATION:

Budgeting for Naval Forces: Structuring Tomorrow's Navy at Today's Funding Level (Study), October 2000.

Option 050-02
Buy More Amphibious Ships

One of the Marine Corps's stated requirements is for enough transport capacity (or lift) in the Navy's amphibious warfare fleet to carry the assault echelons of three Marine expeditionary brigades (MEBs). According to the Corps, that amount of lift would allow Marines to perform forcible-entry operations in two widely separated theaters at the same time. Fiscal constraints have kept the Navy's amphibious fleet short of that goal, however. In their current plans, the Congress and the Department of Defense are providing funds for an amphibious fleet of 36 ships—only enough to transport 2.5 MEBs.

This option would make up the difference by buying seven additional ships. Current plans would buy eight LPD-17 amphibious transport docks from 2001 through 2004 at a rate of two per year. This option would continue purchases at the same rate for a few more years, buying another seven LPD-17s after 2004. The option would cost a total of about $7 billion in budget authority over the next 10 years, virtually all of it coming from building the additional ships. Eventually, the costs to operate the seven extra ships would amount to about $400 million per year in today's dollars, but almost all of those costs would not occur until after 2011.

According to the Marine Corps, the nearly 14,000 troops of a Marine expeditionary brigade are the smallest force capable of conducting a forcible-entry operation. The 3-MEB capability could allow the Marines to conduct one such operation in, say, the South Pacific and another in the Mediterranean region at the same time. (Under normal conditions, a 3-MEB capability would be enough to transport MEBs for operations in only two regions because some of the amphibious fleet would be undergoing

repairs.) Alternatively, those MEBs could compose the assault echelon of a Marine expeditionary force, which could conduct a large amphibious assault in a major theater war.

The Navy's plan for an amphibious fleet of 36 ships envisions having 12 large-deck amphibious assault ships of the LHA or LHD type, 12 dock landing ships (LSDs), and 12 amphibious transport docks (LPDs). The Navy is currently building the new LPD-17 class of amphibious transport dock. Once those ships are completed and delivered late in the next decade, the amphibious fleet will have a 2.5-MEB lift capability. (The current lift capability is less than 2 MEBs.) In addition, the Navy plans to replace its LHA amphibious assault ships, which are nearing the end of their useful service life, with a variant of the LHD starting in 2005.

Lift capability for Marine expeditionary brigades can be broken down into five components: the number of troops that can be carried, the number of spots for vehicles, the cargo capacity, the number of vertical take-off and landing spots, and the number of landing-craft spots. The 36-ship amphibious force will have enough cargo capacity, vertical take-off and landing spots, and landing-craft spots to meet the 3-MEB requirement. The shortfall is in the numbers of troops and vehicle spots. Seven additional LPD-17s could carry enough troops and vehicles to fulfill the 3-MEB requirement.

The primary advantage of this option is that it would help the military adapt to changing conditions. In the post-Cold War era, the United States has conducted only one major theater war (the Gulf War) but several small-scale, low-intensity operations, such as those in Haiti, Somalia, and Liberia. If that trend continues, the United States may be making much greater use of the Marine Corps. The Corps's mobile, amphibious force structure is particularly well suited for smaller, quick-response operations. In addition, the Navy's doctrine statement, *Forward . . . From the Sea,* argues that the United States is most likely to be involved in relatively small conflicts along the world's coastal regions—precisely the kind of expeditionary warfare that the Marine Corps emphasizes. Thus, being able to put a crisis-response force in two theaters at the same time could be very useful. Moreover, although the United States has not conducted a large amphibious assault since the Korean War, a 3-MEB lift capability would give it the ability to do so again if necessary.

Critics of this option might argue that the additional ships are unnecessary and that even the goal of a 2.5-MEB lift capability is too high. Since the end of the Korean War, most Marine Corps operations have been conducted by Marine expeditionary units (MEUs) of 2,800 troops or less. One MEU can be carried by three ships (usually an LHA or LHD, an LSD, and an LPD), so with 36 ships, the Navy would have enough amphibious lift to deploy 12 MEUs, or about 34,000 troops. Moreover, in peacetime, three MEUs are always kept deployed overseas. Thus, critics could argue, the current amphibious fleet is more than large enough for most operations that the Marine Corps is likely to conduct. And in a large war, the difference between transporting 2.5 or 3 MEBs would probably not matter—either force would eventually require substantial support from the Army and Air Force. □

Option 050-03
Preposition Equipment for Bombers at Forward Bases

The Air Force has spent a great deal of money to store ("preposition") equipment for its short-range combat aircraft on board ships and at storage sites around the world for use during a conflict. But it has not done anything as extensive for its bomber force. According to official analyses such as the Department of Defense's *Heavy Bomber Force Study* and the 1999 *U.S. Air Force White Paper on Long Range Bombers*, in a regional war that occurred without warning, bombers could play a crucial role during the earliest phase—before the United States had deployed its ground and short-range air forces. Current plans call for bombers to operate from the United States during the early days or weeks of a war. But the very long transit times from the United States to many likely theaters would allow each bomber to make only about one sortie every three days.

This option would buy enough equipment to support 52 bombers and preposition it at two forward

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	322	58
2003	253	180
2004	272	239
2005	340	271
2006	347	310
2002-2006	1,534	1,058
2002-2011	1,787	1,770

RELATED CBO PUBLICATIONS:

Options for Enhancing the Bomber Force (Paper), July 1995.

Moving U.S. Forces: Options for Strategic Mobility (Study), February 1997.

bases: the islands of Guam in the Pacific and Diego Garcia in the Indian Ocean. (Those bombers would be 16 B-2s, 18 B-1Bs, and 18 B-52Hs.) Buying and prepositioning the equipment would cost a total of about $1.8 billion in budget authority through 2011, including $11 million a year for maintenance.

The principal advantage of this option would be to increase military capability. With prepositioned equipment, bombers could take off from the United States, deliver their bombs in theaters in the Middle East or Asia, and then recover at one of the forward bases, where fresh crews would meet them. From those bases, the Congressional Budget Office estimates, bombers would be able to conduct roughly one sortie per day—increasing by 50 percent to 80 percent the number of weapons they could deliver in the theater during the critical first 15 days of a conflict.

Although this option would be costly, it would be at least 10 times less expensive than buying 20 additional B-2 bombers, as some analysts have proposed. It would also be more effective early in a conflict that began with very little warning—the type of conflict in which U.S. forces would be at the greatest disadvantage and bombers would be the most effective, according to DoD.

Several drawbacks weigh against those advantages. Prepositioning equipment would do nothing to increase the size of the bomber force, as some analysts have advocated. And although it would boost the capability of the force at a critical point in a conflict, it would not address other scenarios in which more bombers might be needed. Other options—such as increasing the types of weapons that bombers can carry, improving their avionics, keeping all 94 of the Air Force's B-52Hs, buying more B-2s, or buying more precision munitions—would provide improvements that would be useful in a wider range of scenarios, but in most cases at higher cost. Finally, some critics would contend that the money required for this option would be better spent improving the Air Force's ability to deploy its short-range aircraft to regional conflicts. □

Option 050-04
Buy More JSTARS and Global Hawk UAVs

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	282	51
2003	292	171
2004	326	275
2005	327	331
2006	154	327
2002-2006	1,381	1,155
2002-2011	3,068	2,737

RELATED CBO PUBLICATION:

Options for Enhancing the Department of Defense's Unmanned Aerial Vehicle Programs (Paper), September 1998.

The Joint Surveillance Target Attack Radar System is a joint Army/Air Force reconnaissance system designed to detect mobile and stationary targets on the ground and transmit their location to ground commanders and combat aircraft. The Air Force originally planned to buy 19 aircraft equipped with JSTARS, but in the 1997 Quadrennial Defense Review, the Secretary of Defense called for cutting that number to 13. Department of Defense officials said that number would provide enough radar coverage for one major theater war. If a second major war occurred at the same time, however, some of those aircraft would have to be redeployed, possibly creating gaps in coverage. In either case, the JSTARS aircraft operate at the forward edge of U.S. forces rather than far in front, limiting the risk to the 20 or more crew members who operate them. In such a position, JSTARS's radar coverage extends for only about 180 kilometers—far less than the range of many of the weapons that the services will operate under their deep-strike strategy for future warfare.

This option would restore four of the six JSTARS aircraft cut by the 1997 Quadrennial Defense Review, at a cost of $282 million in budget authority in 2002 and $2.3 billion over 10 years. (The Congress has already appropriated money for two of those planes.) To provide deeper coverage of enemy ground forces, this option would also buy 11 extra Global Hawk unmanned aerial vehicles (UAVs), another aircraft the Air Force is developing for aerial reconnaissance. The high-altitude, long-endurance Global Hawk is expected to provide the same type of radar imagery as JSTARS, although it will be less capable in terms of coverage area and several other important aspects. Buying and operating those 11 UAV systems would cost a total of about $770 million through 2011.

The radars on both JSTARS and Global Hawk incorporate a moving-target indicator and a synthetic aperture radar. The moving-target indicator detects and tracks formations of moving vehicles. Skilled analysts can often use that information to determine the size and type of the formations. Should the vehicles come to a stop and thus disappear from the moving-target indicator, the synthetic aperture radar can still be directed to provide a detailed image for commanders to rely on.

Such imagery is a valuable tool in achieving information superiority on the battlefield, as envisioned in DoD's official doctrine statement, *Joint Vision 2020.* In a major theater war, knowing what types of enemy forces are moving toward U.S. troops is crucial to attacking them with precision munitions or air power before they can engage U.S. ground forces. Similarly, in a peacekeeping operation, moving-target indicators can tell the commander whether opposing parties are moving large numbers of troops and equipment—perhaps in a way that would violate the peace.

This option would improve the U.S. military's capability for aerial reconnaissance. According to the Air Force, 19 JSTARS aircraft are enough to provide coverage for two major theater wars. In addition, the unmanned Global Hawks would be advantageous in situations in which U.S. air and ground commanders needed to collect intelligence with a moving-target indicator far beyond the forward line of U.S. troops. If the unmanned aerial vehicle was shot down during such a mission, no lives would be put at risk.

Critics of this option could point out that JSTARS has an older airframe and has suffered from problems integrating its radar and command-and-control systems with that frame. Putting a cheaper system into a smaller, more modern aircraft (such as a business jet) might be more cost-effective. In addition, using Global Hawks in the way that this option envisions would pose some technical challenges associated with transmitting large amounts of data to ground stations for processing. That could add even more risk to a program that is already technologically complicated. □

Option 050-05
Increase the Aircraft Carrier Fleet to 14

Today's Navy includes 12 aircraft carriers. That size fleet—recommended in the 1993 Bottom-Up Review (BUR)—represented a fiscal compromise between 10 carriers, the number needed to conduct two nearly simultaneous major theater wars, and 15, the number

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	210	0
2003	850	30
2004	4,860	190
2005	0	640
2006	280	1,090
2002-2006	6,200	1,950
2002-2011	25,850	16,720

RELATED CBO PUBLICATIONS:

Budgeting for Naval Forces: Structuring Tomorrow's Navy at Today's Funding Level (Study), October 2000.

Improving the Efficiency of Forward Presence by Aircraft Carriers (Paper), August 1996.

needed to keep at least one carrier deployed at all times in each of three theaters (the western Pacific, the Indian Ocean, and the European area—usually the Mediterranean Sea). The 1997 Quadrennial Defense Review reaffirmed the decision to limit the carrier fleet to 12. As a result of that limit, the Navy is able to keep an aircraft carrier deployed in the western Pacific year-round, but it experiences gaps totaling about two months a year in the other two areas.

This option would add two carriers and two air wings to the Navy's forces, closing almost all of the gaps in carrier presence. Specifically, it would buy a new carrier in 2004 and another in 2008, giving the Navy a force of 13 carriers in 2010 and 14 by 2015. It would also buy enough tactical aircraft to fill out the two new air wings that would be created to deploy on those carriers.

The Navy considers providing a strong overseas presence its principal peacetime mission. According to proponents, such forward presence deters potential aggressors from threatening U.S. interests, reassures friends and allies about the United States' commitment to them, and allows the military to respond to a crisis faster than if ships had to sail from U.S. ports. An aircraft carrier and its battle group are particularly well suited to provide forward presence because they can respond quickly and perform a variety of missions, such as conducting air strikes against targets on land, supporting U.S. troops that go ashore, reinforcing U.S. diplomacy, enforcing maritime sanctions or no-fly zones, or assisting in humanitarian crises. Thus, when gaps in carrier presence occur, the United States risks responding to a crisis less quickly or with a less capable force.

Although the BUR said 15 aircraft carriers were needed to provide full-time presence in three regions, a fleet of 14 would probably suffice because the Navy is implementing an incremental maintenance plan. To keep carriers ready for use during crises, it is eliminating the complex overhaul period for each ship and spreading upkeep more evenly throughout the ship's operating cycle. By doing so, the Navy can squeeze a little more deployment time out of a carrier's service life.

Closing the gaps in carrier presence would be expensive. This option would cost a total of nearly $26 billion in budget authority over the next 10 years—$12 billion to purchase the two carriers and $13 billion to buy the additional aircraft for them. This estimate also includes nearly $1 billion a year in operating costs from deploying the first additional aircraft carrier and its associated air wing. Eventually, the cost to operate both carriers would reach $2 billion a year.

This option would not buy the additional surface and support ships that accompany a carrier when it deploys. A carrier battle group notionally comprises one carrier, six surface combatants, two attack submarines, and a combat logistics ship. To provide sufficient escort for the new carriers, the Navy would have to either reduce the number of ships that accompany its existing carriers or curtail the independent operations of surface ships and attack submarines.

Not everyone would agree that the Navy should spend more money on aircraft carriers. Critics might ask why the Navy needs full-time carrier presence in Europe and the Indian Ocean. Gaps in coverage there, they might argue, could readily be filled by groups of surface ships, which almost always include ships equipped with the powerful Aegis air-defense system and Tomahawk land-attack missiles. Further-

more, the gaps in carrier presence in the European and Indian Ocean theaters presumably do not usually overlap; thus, a carrier based in the Mediterranean could respond to a crisis in the Persian Gulf relatively quickly.

Proponents of a smaller international role for the U.S. military assert that the United States maintains too much forward presence. They favor a foreign policy that does not deploy U.S. forces around the globe. They could argue that the United States had little reason to intervene in places such as Kosovo, Iraq, or Haiti—all of which involved using aircraft carriers. If the nation changed its foreign policy accordingly, the Navy would have less reason to deploy carriers overseas and could perhaps keep fewer carriers, not more (see the next option).

Other critics contend that the Navy should spend its money elsewhere. In future conflicts, they see aircraft carriers as potentially large, lucrative targets for opponents who may be armed with relatively inexpensive antiship cruise missiles or diesel-electric submarines (see option 050-26). Many of the weapon systems in a carrier battle group, such critics argue, are designed to protect the carrier rather than deliver ordnance at an enemy. Thus, it might make more sense for the Navy to invest in weapons that deliver relatively more punch for the money spent. □

Option 050-06
Reduce the Number of Aircraft Carriers to Ten and Air Wings to Nine

The aircraft carrier is the centerpiece of the U.S. Navy. The Clinton Administration's defense plans called for a fleet of 12 carriers. Those ships require a total of 11 active-duty air wings. (The number of active air wings is one less than the number of carriers because, at any time, one of the Navy's carriers is usually undergoing a major overhaul.) Aircraft carriers are also accompanied by a mix of surface combat ships (usually cruisers and destroyers) and submarines to defend against aircraft, ships, and subs that threaten the carriers. The surface combatants and submarines can also attack targets on land.

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-4,740	-490
2003	-1,520	-1,190
2004	-2,550	-1,740
2005	-2,060	-2,180
2006	-7,180	-2,820
2002-2006	-18,050	-8,420
2002-2011	-37,660	-32,530

RELATED CBO PUBLICATIONS:

Budgeting for Naval Forces: Structuring Tomorrow's Navy at Today's Funding Level (Study), October 2000.

Improving the Efficiency of Forward Presence by Aircraft Carriers (Paper), August 1996.

Since the Cold War ended, some policymakers have argued that the United States does not need a force of 12 aircraft carriers. The total capability of U.S. tactical aircraft in the Navy and Air Force will substantially exceed that of any regional power that seems potentially hostile. Moreover, the capabilities of U.S. ships are unsurpassed worldwide.

This option would retire one conventionally powered aircraft carrier immediately and one nuclear-powered carrier, the *Carl Vinson*, at the end of 2004. The Navy would then have 10 carriers. The option would also delay the Navy's new carrier, the CVNX, by 10 years. In addition, it would eliminate two air wings, leaving nine.

Compared with the Clinton Administration's planned forces, those cuts could save almost $5 billion in budget authority in 2002 and $38 billion over the next 10 years. Of that amount, $10 billion would result from canceling the Nimitz class carrier authorized last year and not buying the first CVNX carrier in 2006, as now planned. Another $2 billion would represent reduced development costs associated with postponing the CVNX. An additional $2 billion would be saved by not overhauling the *Carl Vinson* in 2005. The remaining savings would come from

reduced operating costs associated with retiring two carriers and air wings ($14 billion) and lower procurement costs from buying fewer aircraft ($10 billion). Those estimates include the cost of decommissioning the retiring ships—roughly $100 million apiece. (Cutting carriers could also reduce the number of surface combatants and submarines the Navy would need to accompany them. Thus, the Navy might save even more money on procurement and operations by not having to buy and operate as many other new ships. Conversely, the Navy might need those ships to perform other missions, such as forward presence, once it had fewer carriers.)

Although reducing the force to 10 carriers might not impair the United States' ability to fight and win two major theater wars (according to one analysis by the Department of Defense), having fewer ships would limit the Navy's ability to keep three carriers deployed overseas most of the time. That could substantially increase the strain put on the carrier force as long as policymakers continued to use aircraft carriers to respond to crises or to provide forward presence as extensively as they have in recent years. With fewer ships available, the time that those ships spent at sea could increase. The high-quality sailors the Navy needs would therefore spend more time away from their homes and families, perhaps making them less inclined to stay in the service.

The Navy might be able to maintain more forward presence with fewer carriers by bringing new crews to the ships while they were at foreign ports rather than waiting for them to return home. (The Navy does that with some minesweepers.) In addition, it could use ships other than carriers—such as large flat-deck amphibious vessels or Aegis cruisers—to help maintain U.S. presence overseas. □

Option 050-07
Use Marine Corps Squadrons to Fill Out Navy Air Wings

The F/A-18 is the workhorse of both the Navy and Marine Corps fighter fleets. It has operated from the decks of aircraft carriers and in Marine air wings since the early 1980s. The Navy has a stated requirement of 34 squadrons of F/A-18s for its carrier air wings. (Each squadron consists of 12 planes.) However, it has only enough F/A-18s today to fill out 29 of those squadrons. The Marine Corps has 18 squadrons of F/A-18s to provide air support to Marine ground forces. The Navy uses five of those Marine Corps squadrons to fill out its carrier air wings.

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-145	-113
2003	-300	-252
2004	-310	-288
2005	-452	-328
2006	-1,024	-471
2002-2006	-2,232	-1,452
2002-2011	-15,938	-13,761

RELATED CBO PUBLICATION:

A Look at Tomorrow's Tactical Air Forces (Study), January 1997.

This option would cut six of the Navy's F/A-18 squadrons—the planes in two operational carrier air wings—and use six more Marine Corps squadrons in their place. Thus, it would reduce the total number of F/A-18 squadrons from the current level of 47 to 41. That change would result in operating savings of about $300 million in budget authority per year and a total of $3.1 billion through 2011.

In addition to reducing operating costs, this option would save money on procurement because the Navy could decrease its planned purchases of the F/A-18E/F by about 185 planes (taking into account the aircraft in the six eliminated squadrons as well as the additional planes that would have been needed for maintenance and training purposes and to make up for expected attrition). Assuming those planes were eliminated from the end of the F/A-18E/F procurement program, procurement savings would amount to $133 million in 2005 and $12.8 billion over 10 years. Such savings could be especially useful since the services' planned spending on various fighter aircraft

may exceed the amount they will actually be able to devote to such purchases.

Proponents of this option would argue that the United States may not need all 47 of its current F/A-18 squadrons for the type of conflict that is probable today. If a major conflict had occurred during the Cold War, Navy, Air Force, and Marine Corps fighter aircraft would have been likely to operate in different areas. Each of the Navy's operational carriers would have needed its full complement of aircraft to conduct offensive operations and defend itself and its accompanying ships. Those carriers might well have been assigned to missions that would take them away from the flanks of NATO, where Marine Corps ground operations were likely to have taken place. Air Force fighters would have been engaged in combat with fighters of the former Soviet Union over central Europe. Thus, the Marine Corps would have had to rely on its own squadrons for air support. But today, critics say, even major theater wars will probably be sufficiently confined that aircraft carriers and their air wings will be able to remain in the theater to provide air support for the Marines.

In a major theater war, Air Force fighters might also be on hand to give air support to Marine forces. They could probably provide that support just as quickly as Marine Corps squadrons. The reason is that Marine Corps F/A-18s cannot operate from carriers that have a full complement of Navy aircraft (because the Navy planes take up most of the carriers' operating space), so some of the squadrons that are not part of carrier air wings must operate from bases on land. And if such bases are available for Marine Corps operations, they might just as easily be used by the Air Force's fighters.

In making its cuts, this option would keep Marine Corps squadrons rather than Navy squadrons. Marine Corps officers argue that they are better suited to support Marine ground units than Navy pilots are because their training encompasses not only air combat but also ground combat operations. Moreover, Marine Corps pilots already train for aircraft carrier operations. This option would preserve 41 squadrons—seven more than needed to fill the carrier air wings—for three reasons: carriers may have some excess operating capacity, the remaining planes might offset any combat losses, and some land-based F/A-18 squadrons might be useful in augmenting the capabilities of Air Force fighters.

This option would have significant drawbacks, however. It would cut a part of the military's force structure that could be highly useful in the future. Tactical aircraft have made significant contributions in recent conflicts. Moreover, fighter and attack aircraft have been heavily used in recent smaller-scale contingency operations, so cutting their number could further strain personnel and equipment in the squadrons that remained. □

Option 050-08
Reduce Air Force Tactical Forces

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-330	-256
2003	-682	-581
2004	-704	-668
2005	-726	-708
2006	-747	-735
2002-2006	-3,189	-2,948
2002-2011	-7,243	-6,951

RELATED CBO PUBLICATION:

A Look at Tomorrow's Tactical Air Forces (Study), January 1997.

The tactical fighter forces of the Air Force comprise the equivalent of about 20 combat wings—12.6 on active duty and 7.6 in the reserves. (Each tactical air wing notionally consists of 72 combat planes, in three or more squadrons, plus another 28 planes for training and maintenance purposes.) Substantial disagreement exists about whether all of those air wings are necessary, since U.S. tactical aircraft enjoy overwhelming superiority compared with the forces of any regional power that appears potentially hostile to the United States.

This option would reduce the Air Force's tactical fighter forces to 18 air wings by the end of 2002. Those cuts would lower the service's operating outlays by $256 million in 2002 and nearly $7 billion through 2011. (The funds required for fighter purchases might also be reduced; see options 050-31 and 050-32.)

Cutting the number of Air Force wings to 18 might leave the United States with an acceptable number of capable fighters. Even in terms of simple numbers, U.S. fighter inventories exceed those of any potential regional aggressor. U.S. aircraft are also more sophisticated than those of potential enemies.

However, retaining only 18 wings in the Air Force would not meet the military's current estimate of its requirements. Today's force planning assumes that the United States needs to be able to fight virtually simultaneous wars in two regions of the world—perhaps one in the Middle East and another on the Korean Peninsula. Winning two nearly simultaneous regional conflicts would require a minimum of 20 air wings, the Department of Defense has stated.

Some analysts would also argue that additional cuts in Air Force wings ignore a major lesson from the Persian Gulf War: that aerial bombardment by tactical aircraft can be very effective and may greatly accelerate the end of a war, thus reducing loss of life among U.S. ground troops. The recent conflict over Kosovo was waged chiefly by U.S. and allied air forces. Thus, future conflicts might require more air power, not less. A sizable inventory of tactical aircraft—perhaps more than would be maintained under this option—might therefore be a wise investment. (To counter the aging of the Air Force's fleet of tactical fighters, option 050-14 would buy additional current-generation aircraft while new fighters are being developed.) □

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-237	-208
2003	-494	-457
2004	-513	-501
2005	-532	-524
2006	-551	-543
2002-2006	-2,328	-2,233
2002-2011	-5,170	-5,047

RELATED CBO PUBLICATIONS:

Making Peace While Staying Ready for War: The Challenges of U.S. Military Participation in Peace Operations (Paper), December 1999.

Structuring the Active and Reserve Army for the 21st Century (Study), December 1997.

Option 050-09
Eliminate Two Army National Guard Combat Divisions

The Army National Guard has eight combat divisions. In 1995, the Commission on Roles and Missions of the Armed Forces reported that several of those divisions were not needed to carry out the nation's military strategy of being able to fight two nearly simultaneous major theater wars. Overall, the commission said, the Army has more than 100,000 excess combat troops that are not required for that security strategy. The commission also argued that the Guard has too many combat divisions even given its other missions, such as providing forces for rotation during wartime and supporting civil authorities at the state level.

This option would eliminate two National Guard combat divisions: one armored division and one mechanized infantry division. Doing so would reduce the Army's excess combat forces by about 35,000. The Army is planning to convert about 48,000 Guard combat troops into combat-support and combat-service-support troops (see option 050-11), but that conversion would still leave the Army with more than 50,000 extra combat troops. This option would eliminate most of that excess. (Since the Army has identified a shortage of support forces, this option would retain all of the support personnel associated with the eliminated divisions.)

The primary advantage of this option is the savings it would generate. Cutting the two divisions would save the Army an average of about $500 million a year in operating outlays over 10 years—funds that could be used to modernize the rest of the Army's active-duty and reserve forces more quickly. Eliminating those divisions could also help the Army avoid some future costs, since the equipment in the two disbanded divisions would not need to be modernized.

This option would have several disadvantages, however. First, it would reduce the number of reserve forces available as reinforcements during wartime. But how risky such a reduction would be is unclear, because analysts disagree about whether Guard combat forces could be ready to fight in time to help in a major theater war. Second, these cuts might reduce the Army's flexibility by leaving fewer reserve forces to use in peacetime missions. The Army has sent reserve combat troops to peace operations such as the long-running one in the Sinai Peninsula, and it plans to send more reservists to similar operations in the future. Third, this option would reduce the number of forces available for governors to call on to support missions in the states. □

Military Participation in Smaller-Scale Contingency Operations

The U.S. military's increasingly frequent involvement in smaller-scale contingency operations raises two key operational questions. First, are U.S. forces well structured to carry out those operations on a routine basis? And second, how does participating in such operations affect the ability of U.S. troops to carry out their primary mission of fighting and winning a conventional war? At first glance, deployments on the scale of those in Somalia, Bosnia, or Kosovo (involving 15,000 to 30,000 U.S. troops) would seem to pale in comparison with the half-million personnel the United States sent to the Gulf War or the similar numbers stationed in Vietnam for nearly 10 years. How can deployments that are so much smaller create significant stress on the military?

One part of the answer is that the forces needed for smaller-scale contingency operations are not necessarily the same types as those needed for major theater wars. Certain kinds of ground forces—combat-support and combat-service-support units such as transportation, civil affairs, and water purification units—are critical to such operations. Those special units are in much heavier demand for such operations than other types of units are. To complicate the equation, those support functions are most commonly performed by reserve units, so the few active-duty units of that type are required to deploy extremely often.

Another part of the answer may be the degree to which resources can be readily mobilized. When a nation goes to war, its military mobilizes fully. Personnel alter their expectations, accept hardships, and shelve training and education plans; at the same time, all of a military department's resources are devoted to meeting the threat to national security. But smaller-scale contingency operations are conducted under peacetime rules and processes. While the deployed units seek to accomplish their missions, the rest of the military establishment goes about its normal peacetime activities. Furthermore, the military expects to rotate personnel back home after six months or so. Conducting military operations under peacetime conditions takes a toll not only on a military department's forces but also on its budget, its supply and depot structure, and DoD's transportation system.

The options below are intended to ease some of the burden that smaller-scale contingency operations impose by adding forces or converting existing units to the types of units most in demand for such operations.

Option 050-10
Increase Staffing Levels in Military Units

At any given time, some units in all of the services have fewer people available to work than their personnel requirements specify. Some of those shortfalls are deliberate; others may reflect the difficulties of managing a large workforce with people constantly shifting among assignments. Still others oc-

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	669	584
2003	1,961	1,778
2004	3,334	3,121
2005	4,114	3,969
2006	4,241	4,187
2002-2006	14,318	13,639
2002-2011	37,566	36,693

cur simply because people are on leave, ill, or away for training or other temporary assignments. In recent years, the succession of smaller-scale contingency operations has added a new problem, especially in the Army and the Air Force: portions of units are sent overseas, often on short notice, drawing personnel from the rest of the unit and leaving it scrambling to perform its routine mission and to train effectively. In such cases, readiness can suffer, and the personnel left behind may have to work long hours.

This option would try to reduce the impact of personnel shortages on existing units by adding a total of 50,000 active-duty personnel to the military over the 2002-2004 period. Doing that would cost the Department of Defense an extra $584 million in outlays in 2002 and $36.7 billion over 10 years. However, total federal costs would be $5.7 billion lower than that over 10 years because DoD's payments for military retirement and some other personnel programs are intragovernmental transfers and therefore appear as receipts elsewhere in the budget.

Although DoD has generally maintained that planned force levels are adequate, officials from each of the services have at times expressed a desire for more personnel. Late in fiscal year 2000, three of the services appeared ready to ask formally for increases. The Army reportedly would request 15,000 to 40,000 additional personnel, the Air Force 10,000, and the Marine Corps an unspecified number. (In 1999, the outgoing Marine Corps Commandant said that his service could use another 5,000 troops.) The Navy reportedly had no plans to request more personnel, although its Secretary said in 1999 that he would like to forgo that service's remaining planned personnel cuts (at the time, about 2,000). Moreover, the Navy continues to have roughly 10,000 authorized positions in the fleet that are unfilled.

The added personnel in this option would be distributed as follows: 25,000 for the Army (an increase of about 5 percent); 10,000 each for the Navy and Air Force (increases of 3 percent); and 5,000 for the Marine Corps (an increase of 3 percent). The services would be left to decide how those additional personnel would be used. For example, they might be used to fill empty positions, provide an overstrength "cushion" for units to ease the strain of routine or unforeseen personnel shortages, or increase staffing in occupational specialties that have been in high demand for smaller-scale contingency operations.

This option's $36.7 billion price tag over 10 years reflects both the direct costs of the additional personnel and added costs for operations and support, including training at both the individual and unit levels. In addition, the estimate assumes that DoD would increase its spending on new reenlistment bonuses—at an annual cost of roughly $116 million in 2007 and beyond (see option 050-35)—so the services could increase their size without lowering standards or relying solely on new recruits. The added bonuses should help improve retention both overall and in occupations suffering from particularly severe shortages. (The option assumes that no new units would be formed, so it would have no direct effect on the quantity of weapons and other systems procured in the future.)

The strains caused by frequent deployments have been most evident in the Army and the Air Force. Traditionally, the Army has deliberately understaffed many of its operational units, providing a full complement of personnel only to those scheduled to deploy first in the case of a major theater war. For smaller-scale deployments, however, the burden of providing troops may fall on the understaffed units. (One example occurred in 1998, when the 1st Cavalry Division was ordered to send a brigade and its division headquarters to Bosnia. To fill out the deploying elements, it drew 581 personnel from the

nondeploying portions of the division as well as 166 people from elsewhere in the Army.) In 2000, the Army reversed its longstanding policy, bringing all of its divisions and some other units up to full staffing levels at the expense of other portions of the force, such as the Training and Doctrine Command and the Materiel Command.

Deployments can affect even fully staffed units, however. For example, an Air Force unit may have to send a large complement of security police and other support personnel to accompany a small portion of its combat force on an overseas deployment. In both the Army and the Air Force, training for the units left at home can suffer as experienced noncommissioned officers are sent with the deploying units.

Besides decreasing the readiness of military units, personnel shortages can affect service members' satisfaction with the military and thus, potentially, their decision whether to remain in the service. As noted above, when deployments involve parts of units, those left behind can face increased workloads, either because understaffing becomes more severe or because the routine work of the military installation is spread among a smaller number of personnel. A 1999 survey by the General Accounting Office found that the level of unit staffing and the frequency of deployments were important sources of dissatisfaction among a sample of personnel in occupational specialties with critical retention problems. Although those findings may not apply to the military as a whole, they suggest that increased staffing could help solve some of the services' retention problems.

Critics of increased staffing could argue that, as a practical matter, the services would have difficulty expanding personnel strength at a time when some of them are reporting problems with recruiting and retention. Other opponents of expansion might argue that the strains caused by recent deployments simply reflect the need for the services—particularly the Army and the Air Force—to adapt to a new environment. The Air Force's new concept of the Expeditionary Aerospace Force, which gives each unit a predictable "window" during which it is subject to possible deployment, may be a solution to some of the problems that service has experienced and could be a useful model for the Army to follow.

Some critics of this option might say the real problem is that the services have tried to maintain more force structure than they can effectively staff within existing strength limits. By eliminating units, they could free up personnel for other assignments. That objection might apply best to the Army, which some analysts maintain could reduce its active-duty force structure and place greater reliance on reserve forces in the event of a major theater war. Other critics of this option might argue that instead of being used to fill out existing units, any additional personnel for the active Army should be assigned to new units dedicated to taking part in peace operations (see option 050-12).

Proponents of increased staffing in existing units could dispute some of the critics' claims. Problems in recruiting and retention, they might argue, have already been addressed by planned military pay raises and improved retirement benefits. In addition, the Expeditionary Aerospace Force concept will not solve the problem of overwork in nondeployed units, they might say, and would not affect the Army's deliberate understaffing of some units. □

Option 050-11
Create Additional Support Forces in the Active Army

To fight two major theater wars that occurred nearly simultaneously, the Army would need more than 58,000 additional support forces, according to the service's *Total Army Analysis 2003*. The Army plans to alleviate that shortfall by converting about 48,000 National Guard combat troops into support troops (through the Army National Guard Division Redesign program).

This option would address the rest of the shortage by converting one active-duty armored division entirely into support units (thus eliminating the division from the Army's combat forces). That conversion would entail a one-time cost of about $1.2 billion in budget authority through 2005. Afterward, it would save about $250 million a year, compared with the cost of the current Army, because the new sup-

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	210	49
2003	320	161
2004	320	257
2005	330	298
2006	-227	29
2002-2006	953	795
2002-2011	-299	-262

RELATED CBO PUBLICATIONS:

Making Peace While Staying Ready for War: The Challenges of U.S. Military Participation in Peace Operations (Paper), December 1999.

Structuring the Active and Reserve Army for the 21st Century (Study), December 1997.

port units would cost less to operate and maintain than the combat units they replaced.

This option would have several advantages. By creating more support units in the active component, it would enable a more rapid buildup of forces for the first major theater war. Also, because support units have been in high demand for smaller-scale contingency operations, creating more of those units in the active force could reduce the deployment rate for current active-duty support troops. It could also reduce the need to activate support units in the reserves for such operations, which would save the Army more money.

Adding support forces to the active component could be inefficient, however, in that the Army would be paying for some full-time units that received little use on a day-to-day basis. Many support forces that exist primarily in the reserves—such as civil affairs and prisoner-of-war units—are there because they were originally seen to be in low demand during peacetime. However, those types of units were called up for peacetime operations in Haiti and Bosnia. If the Army is going to conduct similar operations on a regular basis in the future, the units it will need should perhaps be in the active component.

The major disadvantage of this proposal is that it would reduce the number of active combat forces available for a second major theater war. The Army says it needs 5-1/3 combat divisions for each major theater war. Just 4-1/3 active divisions would be available to fight in the second conflict under this option, so the Army would have to rely more heavily on combat units in the Guard. The service would still have enough combat troops in the Guard to provide the additional forces needed for a second conflict. But according to estimates by the Department of Defense, entire Guard divisions could not be ready in time to participate in a nearly simultaneous second war. The Guard's enhanced readiness brigades would probably be ready in time, but substituting three separate Guard brigades for one division could present some operational problems. □

Option 050-12
Add Forces to the Active Army for Peace Operations

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	751	646
2003	1,510	1,363
2004	2,326	2,157
2005	2,409	2,341
2006	2,490	2,447
2002-2006	9,487	8,954
2002-2011	23,112	22,439

RELATED CBO PUBLICATIONS:

Making Peace While Staying Ready for War: The Challenges of U.S. Military Participation in Peace Operations (Paper), December 1999.

Structuring the Active and Reserve Army for the 21st Century (Study), December 1997.

Department of Defense policy assumes that forces deployed to operations such as peacekeeping or peace enforcement could switch quickly to fighting a major theater war if one broke out. But such a switch may take too long to be feasible. Army forces, particularly combat units, that participate in peace operations may need considerable time to repolish their combat skills through exercises, recondition their equipment, and acquire personnel before being ready to fight a conventional war. Moreover, analysis by the Army indicates that even in the absence of other operations, the service would need all of its active-duty combat forces and all of its active and reserve support forces to fight two nearly simultaneous major theater wars.

This option would address those problems by creating four specialized brigades and three headquarters units dedicated to peace operations, thus increasing the active-duty Army by 20,000 soldiers. The four brigades could be deployed singly or in combination, depending on the requirements of the particular operation. In addition, each brigade would have some of the high-demand support units (such as civil affairs, military police, and transportation) necessary for most peace operations.

A special force of 20,000 soldiers would probably be large enough to carry out most of the operations that occur in peacetime. The Army's rate of deployment since 1990, and attempts by the Office of the Secretary of Defense to project the forces needed to conduct smaller-scale contingency operations in the future, suggest that the Army will deploy an average of about 8,500 personnel to such operations at any given time. Nevertheless, peace operations requiring more than 20,000 personnel at once have occurred every two years or so for the past decade, and DoD projects that they will continue at a similar pace for the foreseeable future. Thus, in times of heavy activity, a peace operations force of 20,000 soldiers would have to be augmented by other troops.

This option would have two major advantages. First, it would improve the Army's ability to conduct peace operations. The specialized units would train primarily for such operations and would be fully staffed at all times (unlike some regular Army units, which are 10 percent to 20 percent below their authorized personnel levels when not deploying). As a result, these units would be ready to deploy to peace operations on short notice. In addition, the high-demand support units in the new brigades would allow the Army to reduce its reliance on support troops in the reserves during peacetime. Thus, the Army could avoid the potential problems associated with calling up reservists frequently, such as having to secure Presidential authorization and disrupting reservists' civilian careers, possibly harming morale and recruitment. Moreover, the specialized headquarters that this option would create would give the Army a stable, consistent source of leadership skills and commanders for peace operations.

Another and perhaps more important advantage of this option is that it would increase the Army's capability and readiness for conventional war. Because the Army would have enough forces both to fight two major theater wars and to conduct most peace operations, forces would not be expected to extricate themselves from an operation to take part in a conventional war. Adding units dedicated to peace operations would also allow existing units to focus primarily on preparing for conventional war.

The greatest drawback of this option is that it would be expensive. Paying 20,000 additional active-duty personnel and operating the new headquarters and brigades would cost about $2.5 billion in budget authority per year, on average, between 2004 and 2011. The new brigades could use tanks, armored personnel carriers, attack helicopters, and other equipment from retiring National Guard combat units, so the costs to equip them would be negligible. But recruiting the additional soldiers could pose a challenge and also increase costs. And although this option would allow the Army to avoid the expense of putting reservists on active duty, those savings would offset the costs of the option to only a very small extent.

Another drawback of this option is that the new forces, being designated for peace operations, could be subject to a high rate of deployment. Frequent deployments could be hard on the morale of the soldiers in those units and their families. That problem might not turn out to be significant, however, since troops would presumably rotate in and out of those units and personnel-management practices could help keep deployment rates to a reasonable level.

A third disadvantage is that since the new units would be equipped and trained specifically for peace operations, they would not be thoroughly trained for combat. But peace operations can sometimes involve armed combat, and units that are not trained for it could have trouble handling such situations. Also, some observers might argue that troops who are not fully trained for combat are less intimidating to potential aggressors, thus making them less effective at keeping the peace. □

Option 050-13
Accelerate Creation of the Army's Brigade Combat Teams

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	777	190
2003	703	430
2004	981	651
2005	1,254	866
2006	-263	677
2002-2006	3,451	2,814
2002-2011	3,542	3,384

Since the end of the Cold War, the Army has had to deploy its troops more frequently, often with little notice. In response, the service has launched a long-term plan to transform itself from a heavy, hard-to-deploy force into a more flexible force appropriate for its post-Cold War missions. As one step on that road, the Army would like to convert some existing units into medium-weight brigade combat teams (BCTs), which are designed to be lighter and more easily deployed than today's armored brigades but more heavily armored and lethal than light infantry brigades. However, the service has had trouble finding enough funds to create the brigade combat teams.

This option would convert a total of nine brigades into BCTs at a rate of two per year, at an added cost to the Army of $3.5 billion in budget authority to equip, operate, and build facilities for the units. The Army has said it would like to convert eight brigades at a rate of two per year, but its budget request for fiscal year 2001 provided funds for only one brigade per year over five years. (The Congress added funds to convert an additional brigade in 2001.)

The Army's ultimate goal is to create what it calls the "objective force," which would be as effective as the current heavily armored force but much lighter and easier to deploy. That force would be equipped with the so-called Future Combat System (FCS), which is already under development and is intended to replace most or all Army tanks and combat vehicles starting in 2012.

Because the objective force will not be available for many years, the Army proposed the brigade combat teams as an interim step. According to the Army Chief of Staff, those units would fill a gap in the current force, be particularly well suited to respond to the smaller-scale contingency operations that have become more frequent in the past decade, and allow the Army to begin developing doctrine and procedures for the objective force. To create the BCTs, the Army plans to retrain soldiers and purchase equipment, including the new Interim Armored Vehicle, which will be much lighter than existing Army tanks. Eventually, the BCTs would also be converted to the objective-force design.

Accelerating the creation of the brigade combat teams (and adding one more of them) could have several advantages. First, it would give the Army greater flexibility in responding quickly to crises while it awaits fielding of the objective force. Second, having nine BCTs available to rotate to smaller-scale contingency operations would provide enough forces for three units to be deployed at the same time. (For each unit sent to such an operation, one unit would be recovering from just having been deployed and another would be preparing to deploy.) Third, this option would make additional BCTs available in the event that the objective force was fielded later than planned. The Future Combat System may not be ready on schedule. It is a notional system that includes several technological advances. The agency that is helping the Army develop the FCS, the Defense Advanced Research Projects Agency, has said the program is at risk for schedule and technical delays.

Critics might argue that funds for additional BCTs would be better spent creating more of the types of units that are in high demand for smaller-scale contingency operations, such as military police, civil affairs, and linguistic units (see option 050-11). Also, some observers doubt that the contractors who are bidding to produce the Interim Armored Vehicles could make them quickly enough to equip two BCTs per year. Some people also doubt whether the Army's training, personnel, and doctrine-development processes could keep up with that pace of conversion. Other critics might argue that rather than increasing its budget, the Army should fund the extra BCTs by cutting programs such as the Crusader artillery system (see option 050-28) or by further reducing its force structure (see option 050-09). □

Modernizing Weapon Systems and Countering Emerging Threats

Among the most important decisions that DoD officials make are those that relate to initiating, continuing, or canceling modernization programs. Such decisions will affect the capability and readiness of the military over many decades.

In setting policies and developing programs, DoD leaders must try to balance competing priorities. They must deal with the issues raised by an aging stock of equipment. They must address gaps in military capabilities that require the development and deployment of new systems to perform new missions. And they must manage the defense technology base so that future weapons designers will have a broad menu of new technologies and capabilities from which to draw. This section contains options that address those various issues. It also includes options that would cancel or scale back existing modernization programs to pay for new initiatives.

Aging Equipment

DoD's acquisition managers substantially reduced purchases of equipment in the 1990s. They justified those reductions on two main grounds. First, the Soviet threat was gone, and Russia (with a few notable exceptions) was no longer turning out newer and better versions of weapons. Second, U.S. forces were being considerably reduced in numbers, so a surfeit of equipment existed from the buying programs of the 1980s. In fact, in the early 1990s, when forces were being cut most rapidly, so much older equipment was retired that the average age of equipment held steady or even fell for some systems.

Today, by contrast, as a result of that hiatus in procurement, many kinds of military equipment exhibit a higher average age than they ever did in the past. Those aging trends will continue for a number of years for most systems, even those for which replacement systems are in production or development (see Table 5).

Service leaders have expressed concern about a number of problems that result from using older equipment—such as increased maintenance costs, decreased availability of parts, the need to cannibalize one unit to keep another running, and various other difficulties in supporting and maintaining equipment. All of those problems result in lower mission-capable rates, decreased readiness, and increased workloads for maintenance personnel. In the worst case, a significant part of the equipment that supports DoD's force structure could be rendered inoperable if unanticipated problems related to aging arose.

To halt or slow trends in aging, DoD could cut its forces, spend more on procurement, or buy less expensive equipment in greater numbers. The Congressional Budget Office has estimated what it would cost for DoD to replace every piece of equipment in its current inventory with a more-modern version. Based on the current service lives of equipment, DoD would have to spend an average of $90 billion a year to purchase replacements in enough quantities to prevent aging.[4]

For weapon systems that have no replacement in or approaching production, DoD could also fund

4. See Congressional Budget Office, *Budgeting for Defense: Maintaining Today's Forces* (September 2000).

Table 5.
Average Ages of Selected Equipment (In years)

Type of Equipment	Specific System(s)	Service	Past or Planned Service Life of System(s)	Average Age In 2000	Average Age In 2010
	Systems Without Replacement Plans				
Tanks	M1 Abrams	Army	30	11	14
Shore-Based Maritime Patrol Aircraft	P-3C	Navy	30-40	23	33
Support Aircraft	E-2, EA-6B, S-3B	Navy	20-36	19	27
Bombers	B-52, B-1, B-2	Air Force	50-70	24	34
Tankers	KC-135, KC-10	Air Force	50-66	38	48
	Systems With Replacement Plans				
Light Attack and Scout Helicopters	OH-58 Kiowa, AH-1	Army	20-36	19	12
Surface Combatants	DD-963, FFG-7, CG-47	Navy	30-40	13	17
Multirole Fighters, Close Air Support	F-14, F/A-18, AV-8B,	Navy	20-30	11	16
	F-16, A-10	Air Force	20-30	14	23
Air-Superiority Fighters	F-15A-D	Air Force	20-30	19	16

SOURCE: Congressional Budget Office based on data from the Department of Defense.

modifications to existing systems, extending their service lives and making them easier to maintain. The department may also want to improve its capability to monitor the stresses that older weapons experience. And it may have to pay more to maintain older weapons.

If the services purchased fewer of their newest and most capable weapon systems, they could buy larger numbers of the systems already in the inventory. Some of the options at the end of this section —which focus on ways to pay for new initiatives— would slow production and reduce purchases of next-generation systems. One of the options below would buy more of today's weapons.

Another way to deal with aging would be to extend service lives for certain systems and upgrade their capabilities at the same time. Costs for upgrades vary, but a rough rule of thumb is that a system's planned service life can be increased by about one-half for two-thirds of the cost of the original system. The Air Force has used that approach to extend the life of its B-52 bombers and KC-135 tankers; the Army and Marine Corps have done the same thing to keep their helicopter fleets in the air.

Another response to problems of aging is to monitor more actively the strains that operations place on a system. The commercial aviation industry has used that approach successfully to target maintenance toward problem areas. An option below would apply that approach to Navy and Marine Corps helicopters.

Option 050-14
Buy More Current-Generation Fighter Aircraft for the Air Force

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	729	131
2003	577	410
2004	62	439
2005	62	247
2006	292	171
2002-2006	1,723	1,398
2002-2011	2,327	2,297

RELATED CBO PUBLICATION:

A Look at Tomorrow's Tactical Air Forces (Study), January 1997.

The Air Force's fleet of tactical fighter aircraft is older, on average, than it has been for many years. Over the next 12 years its average age will rise to unprecedented levels, despite the planned purchase of two new planes: the F-22 and the Joint Strike Fighter (JSF). The programs to produce those fighters could prove both challenging and difficult to afford, so they might be delayed or extended (see options 050-31-A, 050-31-B, and 050-32). Such delays would only exacerbate the aging of the fleet.

To counteract that trend somewhat, this option would buy new models of current-generation fighters (F-15s and F-16s) to replace older models. Those purchases would cost a total of $729 million in budget authority in 2002 and $2.3 billion through 2011. (Force reductions such as the ones discussed in option 050-08 could also slow the aging of the fleet.)

Buying modest numbers of F-15s and F-16s would allow the Air Force to keep both its production lines and its options open should anything go awry with the two new fighter programs. The Congress added funds to the Department of Defense's budget to purchase five F-15s in 2000 and 2001. This option assumes that the Air Force continues to buy F-15Es (since that plane has no signed contracts for foreign sales to keep it in production) at a rate of five per year through 2003, when the F-22 is scheduled to complete operational testing. Those additional F-15s would cost $475 million in 2002 and $484 million in 2003, the period of the added purchases.

DoD also received funds to buy four F-16s in 2001. This option would continue purchasing those planes at a rate of 10 per year through 2008, when the Air Force would receive its first large deliveries of JSFs under the current schedule. Those additional F-16 purchases would add $255 million in 2002 and $1.4 billion over the 2002-2011 period, compared with the program set forth in fiscal year 2001. Such purchases would be a hedge against delays in the JSF program. And if that program slipped beyond 2008 but its costs remained on schedule—a not uncommon pattern in design efforts, in which increased development costs are offset by savings from deferred purchases—adding another year's purchase of 10 F-16s in 2009 would cost about $310 million. □

Option 050-15
Buy Additional Integrated Mechanical Diagnostics Systems for Marine Corps and Navy Helicopters

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	16	3
2003	22	5
2004	8	8
2005	4	8
2006	2	5
2002-2006	51	30
2002-2011	-34	-14

As part of a plan to improve its ability to monitor the maintenance status of its rotary-wing fleet, the Navy is developing the Integrated Mechanical Diagnostics (IMD) system for newer Marine Corps and Navy helicopters. If used properly, systems such as IMD can increase flight safety and decrease turnaround times for maintenance and use of spare parts; as a result, they can save both lives and money. The systems work by monitoring the vibrations that various subsystems on a helicopter give off to determine when those vibrations suggest maintenance problems. Maintenance personnel can access data about how reliably the subsystems are operating by using off-board computers—another feature of IMD.

The Department of the Navy, which purchases Navy and Marine Corps aircraft and systems, plans to install IMD on a variety of newer helicopters. But because of budget constraints, it does not plan to install the system on the Marine Corps's fleet of medium assault CH-46 helicopters, which are scheduled to retire as newer aircraft are fielded. The plan for installing IMD on the Marine Corps's heavy-lift CH-53 helicopters is also slower than it might be because of budget limitations, according to the Marine Corps. This option would purchase the IMD system for CH-46s, accelerate purchases for CH-53s, retrofit 67 H-60 helicopters with the system, and fund miscellaneous shortfalls in the IMD program. To pay for those actions, the Congress would need to add $16 million in budget authority to the Navy's budget for 2002.

The Navy's Office of Safety and Survivability evaluated a commercial variant of IMD, which is already used in the helicopter fleets of the United Kingdom and Canada as well as on helicopters that transport personnel and equipment to offshore mining rigs, and which may be available for off-the-shelf purchases. It adds an expanded flight data recorder (similar to the "black boxes" on airliners) to each helicopter and provides computer systems that let maintenance personnel quickly read the data that are recorded.

According to the Navy office, augmenting and accelerating purchases of such systems would save money in the long run by lowering maintenance costs. In the Congressional Budget Office's estimate, this option would cost a total of $51 million from 2002 through 2006 but would begin saving money in 2007. As a result, the option would yield total net savings of $34 million over 10 years. (For similar efforts to use technology to reduce maintenance costs, see option 050-58.)

More important, the integrated diagnostics systems would save lives by alerting maintenance personnel to potential system failures before they happened. The Navy's Office of Safety and Survivability estimated that installing such systems would reduce peacetime crashes by one-fifth. Because helicopters exhibit erratic flight patterns when they leave controlled flight, crews and passengers cannot eject safely and may not survive a crash. Thus, a reduction in crashes could save lives. Reducing crashes of the older aircraft considered in this option would not save investment dollars, according to the Navy, because the planes that would have crashed would not be replaced in any event. But the fleets of older Marine Corps helicopters might be less taxed by flight operations if they lost fewer aircraft to attrition.

If installing IMD proved to save both lives and costs, other services might decide to use some variant of the system in all of their rotary-wing aircraft, even those that were scheduled to remain in service for only a short period. Therefore, the Navy program might serve as a model for other services' modification efforts. □

Strategic Forces and Missile Defenses

The end of the Cold War has spurred a vigorous debate about the proper role for nuclear weapons and ways to increase nuclear security more broadly. Tensions between Russia and the United States have greatly eased. Both sides have reduced their numbers of short- and long-range nuclear weapons through arms control agreements and unilateral actions. The two countries' conventional forces in Europe have also been cut significantly.

New Threats. Today's security environment is characterized not so much by superpower confrontation as by threats from regional powers and subnational groups. Although such threats were also present during the Cold War, their nature has changed. During the past decade, potentially hostile powers have

greatly increased their programs to develop weapons of mass destruction (chemical, biological, and nuclear) and the ballistic missiles to deliver such weapons.

For much of the 1990s, nuclear issues were on the back burner of the national debate on defense. After U.S. conventional forces proved their dominance during the Gulf War, the United States turned its attention to maintaining enough of those forces to fight and win two nearly simultaneous major theater wars. Regional powers, however, took an entirely different lesson away from the Gulf War: U.S. conventional dominance means that a conventional fight is doomed to failure, but U.S. vulnerability to ballistic missiles and aversion to casualties create other opportunities. An opponent could keep U.S. forces at bay by using missiles tipped with nuclear, chemical, or biological weapons to threaten U.S. regional bases and ports, the populations of allied nations, or even the United States itself.

The ability as well as the motivation to acquire nuclear weapons increased during the 1990s. The nuclear ambitions of regional powers were freed from the constraints of their former Cold War protectors. In addition, the collapse of the Soviet Union and loosening of the old Soviet security apparatus boosted the risk that such powers could get hold of the necessary technologies, materials, and know-how to develop their arsenals. The accelerating pace of proliferation was brought home vividly in 1998 when India and Pakistan tested nuclear weapons and North Korea, India, Pakistan, and Iran tested intermediate-range ballistic missiles.

Thus, despite the U.S. focus on conventional forces for much of the past decade, concerns about nuclear weapons and other weapons of mass destruction have reemerged as important factors in the debate about the future of U.S. forces. The success that the United States has in reducing those threats will affect how it can size, shape, and use its conventional forces in the future.

Possible U.S. Responses. In the wake of the geopolitical changes described above, the United States is reexamining its nuclear policies, including those relating to forces, nuclear weapons, missile defenses, nonproliferation, and U.S.-Russian cooperation to reduce nuclear threats. Some experts advocate cutting U.S. nuclear forces significantly below the 3,500 warheads allowed by the second Strategic Arms Reduction Treaty (START II); they argue that the United States would still have more than enough warheads to deter aggression. Others disagree, contending that the United States should not reduce its forces below current levels (some 8,000 warheads) until Russia does the same. Still others believe that the United States can afford to trim its forces to START II levels now.

Experts also disagree about how the United States should conduct its programs to develop and maintain nuclear warheads. Should it follow the Clinton Administration's approach of continuing the moratorium on testing nuclear weapons by explosion and instead rely on an active program of laboratory testing, experimentation, and computer modeling to ensure the reliability of the nuclear stockpile? Or should the United States resume explosive testing to ensure that the stockpile remains in working order? Should it reestablish a robust production capability that would allow nuclear weapons to be replaced every 20 years (their nominal design life), or should it keep weapons for as long as possible by relying on the ability of the nuclear weapons laboratories to predict when they will wear out? If the latter, is that approach being funded appropriately?

Some analysts' response to emerging threats is to push for defenses against ballistic missiles—both theater defenses (designed to protect troops deployed abroad from short- and intermediate-range missiles) and national missile defenses (designed to protect the United States from long-range missiles). DoD has active programs to develop and deploy both types of systems, but some critics do not think those programs are moving quickly enough.

Although the end of the Cold War has increased the appetite for weapons of mass destruction in some quarters, it has also created new opportunities to control their spread. For example, the changed relationship between Russia and the United States has allowed collaborative efforts—unimaginable during the Cold War—to mitigate those threats. Some of those efforts have helped Russia destroy missiles, bombers, and submarines that are being eliminated under arms control treaties; improve the physical security of its

nuclear weapons and nuclear materials; keep its weapons scientists from selling their skills abroad; and improve its ability to deter nuclear smuggling.

The options below illustrate a variety of possible approaches for making the United States more secure from weapons of mass destruction.

Option 050-16-A
Reduce U.S. Forces to START II Levels by 2004

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-20	-10
2003	-70	-60
2004	-140	-120
2005	-200	-180
2006	-220	-210
2002-2006	-650	-580
2002-2011	-1,850	-1,760

RELATED CBO PUBLICATION:

Letter to the Honorable Thomas A. Daschle regarding the estimated budgetary impacts of alternative levels of strategic forces, March 18, 1998.

The second Strategic Arms Reduction Treaty requires the United States to cut its long-range nuclear forces to 3,500 warheads by 2003—roughly one-third of the 1990 level. START II was approved by the Senate in 1996 but remained unratified by Russia for another four years. In an effort to facilitate approval by the Russian parliament, the United States and Russia agreed in 1997 to amend the treaty in order to delay full implementation until December 31, 2007. (The forces to be dismantled by that date, however, are to be made inoperable by the end of 2003.) Also in 1997, the two nations signed agreements related to the Anti-Ballistic Missile (ABM) Treaty.

The Russian parliament finally approved START II in April 2000. But the treaty will not enter into force until the U.S. Senate approves the amended treaty and the instruments of ratification are exchanged by the two countries. The prospects for that remain unclear. In its resolution of ratification, Russia's lower house of parliament, the Duma, required that the United States also ratify the 1997 agreements about the ABM treaty before Russia will exchange instruments of ratification for START II with the United States. However, many members of the Senate object to the ABM treaty and those agreements.

Today's strategic forces remain largely consistent with the START I treaty:

- 500 Minuteman III intercontinental ballistic missiles (ICBMs) with three warheads each;
- 50 Peacekeeper ICBMs with 10 warheads each;
- 18 Trident submarines (each carrying 192 warheads on 24 missiles); and
- 94 B-52H, 93 B-1B, and 21 B-2 bombers.

To achieve the 3,500-warhead limit in START II, the Clinton Administration planned to cut those forces by:

- Eliminating all 50 Peacekeepers, 18 B-52H bombers, and four Trident submarines by the end of 2007;
- Reducing the number of warheads on Minuteman missiles (from three to one) and on Trident D5 missiles (from eight to five); and
- Redesignating its B-1B bombers for only nonnuclear use.

Although START II has not entered into force, the Clinton Administration decided to eliminate the four Trident submarines over the next four years as a money-saving measure and to redesignate the B-1B bombers to nonnuclear use. However, it planned to maintain 94 B-52Hs and all 50 Peacekeeper missiles until the treaty is in force.

This option, by contrast, would reduce U.S. forces to START II levels even if the treaty does not enter into force. Those cuts would be made by the end of 2004. The primary motivation would be financial; those changes would save almost $1.9 billion in budget authority through 2011. Although this option addresses the reduction of U.S. strategic forces broadly, all of the savings would come from not having to operate Peacekeeper missiles after 2004. (There would be no savings from retiring 18 B-52Hs because the Air Force does not operate them today.) If START II never enters into force and the Air Force is required to maintain Peacekeepers beyond 2011—when it will run out of missiles for test flights—there would be significant costs associated with either reestablishing the Peacekeeper production line or developing a replacement missile. Compared with that possibility, this option would save several hundred million dollars after 2011.

Supporters of this approach argue that keeping long-range forces at today's levels is unnecessary. According to several reports, Russia will have trouble maintaining its forces at START I or perhaps even START II levels. Many of its missiles and submarines are nearing the end of their service life, and production of replacements has slowed to a trickle or stopped altogether. Some advocates of this option also argue that the United States has more than enough nuclear forces to ensure deterrence in the post-Cold War global environment, and the expense and potential danger of maintaining higher force levels is unwarranted. Finally, supporters might argue that the United States' failure to reduce its own nuclear forces undermines its efforts to encourage nonproliferation elsewhere.

Critics argue that U.S. forces should remain at current levels until START II enters into force. They oppose any unilateral reductions. They also worry that Russia might build up its nuclear forces if a hardline government came to power. Other critics believe that the era of bilateral arms control is over but that the United States must undertake a thorough review of its strategy and deterrence requirements before reducing its forces. □

Option 050-16-B
Reduce Nuclear Delivery Systems Within Overall Limits of START II

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-240	-80
2003	-310	-190
2004	-550	-370
2005	-1,090	-790
2006	-1,350	-1,140
2002-2006	-3,540	-2,570
2002-2011	-8,220	-7,910

RELATED CBO PUBLICATION:

Letter to the Honorable Thomas A. Daschle regarding the estimated budgetary impacts of alternative levels of strategic forces, March 18, 1998.

This option would go one step farther than the previous alternative. It would reduce the number of missiles and submarines below the levels planned by the Clinton Administration for START II but keep the number of warheads roughly at START II levels. Specifically, it would retire two additional Trident submarines and 200 Minuteman III intercontinental ballistic missiles by 2007, retaining 12 Tridents and 300 Minuteman IIIs. To keep a similar number of warheads, the smaller Trident force would carry six warheads on each missile instead of five. Minuteman III missiles would carry one warhead apiece. This option would keep the same number of nuclear bombers as option 050-16-A, each carrying an average of 16 warheads. In all, those forces would carry about 3,500 warheads—the limit set in START II.

Compared with keeping U.S. forces at current levels, this option would save $240 million in budget authority in 2002 and $8.2 billion through 2011. Part of those savings—which were outlined in option 050-16-A—would come from reducing forces to START

II levels. This option would save an additional $220 million in 2002 and $6.4 billion through 2011.

Overall, the savings in this option would come from reduced operation and support (O&S) costs and lower levels of investment. The O&S savings, about $5.2 billion over 10 years, reflect the retirement of 50 Peacekeeper missiles, 200 Minuteman missiles, and two Trident submarines. The investment savings, $3 billion, would result from forgoing plans to reconfigure two Trident subs (about $0.9 billion), not upgrading some Minuteman missiles (about $0.9 billion), and ending production of D5 missiles ($1.8 billion). Those savings would be partly offset by the costs of retiring the Minuteman and Peacekeeper missiles and the Trident submarines (about $0.6 billion).

During the Cold War, this option might have raised concerns about stability. By putting more nuclear "eggs" in fewer baskets, the United States would have increased its vulnerability to a surprise attack. But today those concerns are less acute. The United States may now decide that it can safely deploy its warheads on fewer weapon systems. Moreover, this option would retain three types of nuclear systems—the so-called nuclear triad—and thus provide a margin of security against an adversary's developing a new technology that would render other legs of the triad more vulnerable to attack.

The disadvantages of this option include those raised in option 050-16-A about cutting forces before START II enters into force, as well as the disadvantages of cutting the D5 program described in the next option. In addition, carrying more warheads on D5 missiles would reduce the targeting flexibility of U.S. planners, and deploying fewer submarines might increase their vulnerability to Russian antisubmarine forces. Unilaterally cutting forces would also limit the United States' ability to increase the number of warheads it deployed if START II never entered into force and Russia decided not to reduce its nuclear forces.

The advantages of this option are also similar to those described in 050-16-A. In addition, some supporters of this option would argue that current U.S. force requirements are driven by an outdated and unnecessarily large target list. Deterrence, they believe, would still be robust with a much smaller arsenal. □

Option 050-17
Terminate Production of D5 Missiles in 2002

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-220	-40
2003	-290	-130
2004	-460	-250
2005	-830	-520
2006	-480	-650
2002-2006	-2,280	-1,590
2002-2011	-3,100	-3,030

RELATED CBO PUBLICATION:

Rethinking the Trident Force (Study), July 1993.

Under both Strategic Arms Reduction Treaties, the Navy plans to deploy a force of 14 Trident submarines. Each one will carry 24 D5 missiles—the most accurate and powerful submarine-launched ballistic missile in the U.S. inventory. Today, the Navy has 10 Trident submarines armed with D5s and eight armed with older C4 missiles. To keep 14 submarines, it must convert four older subs to carry D5s as well. Conversion of one of the submarines began in 2000, and the next is scheduled to begin in early 2001. To arm the 14-submarine force, CBO estimates, the Navy will have to purchase a total of 425 D5 missiles, 384 of which it will have acquired by the end of fiscal year 2001. If START II enters into force, the Administration will probably cut the number of warheads on each missile from eight to five (for a total of 1,680) to keep the number of U.S. warheads near the ceiling allowed by that treaty.

This option would terminate production of D5 missiles in 2002 and retire six of the eight submarines armed with C4s by 2006. The Navy would then have 384 D5s, which CBO estimates is enough to support a 12-submarine force. To retain a similar

number of warheads, the option would increase the number of warheads on each D5 missile from five to six.

Compared with the Clinton Administration's plan for START I and II, this option would save $220 million in budget authority in 2002 and $3.1 billion through 2011. The savings would come from canceling missile production; retiring six of the eight C4-armed submarines and upgrading only two, rather than four, of them; and operating fewer subs. (An alternative option, 050-25, would convert the four oldest Trident submarines that carry C4s to instead carry conventional land-attack missiles and special-operations forces.)

Terminating production of the D5 would have several drawbacks. The Navy recently extended the service life of Trident submarines from the original 30 years to at least 42 years. Thus, it will need D5 test missiles for a longer period, which may require a greater total purchase than originally assumed. Although 384 missiles would be sufficient for a 12-submarine force with a 30-year service life, they might not be enough for the same force with a 42-year or longer service life. In addition, because the service-life extension of the Tridents has created a potential mismatch between the life span of the submarines and the life span of their missiles, a service-life extension may be required for the D5. If such an extension program involved significant changes to the missile (such as a major redesign of replacement components), additional flight tests might be needed to judge its performance. If the D5 program was terminated in 2002, reopening production lines to provide such test missiles could have major cost implications.

Opponents of this option might also argue that loading more warheads on existing missiles would reduce their range and would lessen the flexibility of the force, since missiles with fewer warheads can cover more widely dispersed targets. In addition, cutting the fleet to 12 submarines could increase its vulnerability to attack by Russian antisubmarine forces.

Nevertheless, some people may consider the capability retained under this option sufficient to deter nuclear war. Although the missiles' range and the submarines' patrol areas would be smaller, they would still exceed the levels planned during the Cold War—when Russia had more antisubmarine forces and the United States intended to deploy the D5 with eight large warheads (W-88s). Moreover, less targeting flexibility might not reduce the nuclear deterrent: 1,680 warheads deployed on 336 missiles might not deter an adversary any more than the 1,728 warheads on 288 missiles called for in this option. Also, the smaller likelihood of nuclear war and Russia's atrophying nuclear forces may have weakened the rationale for the United States to be able to increase its forces rapidly by adding warheads to the D5. □

Option 050-18
Reduce the Scope of DOE's Nuclear Weapons Activities

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-110	-70
2003	-200	-160
2004	-290	-260
2005	-390	-350
2006	-470	-440
2002-2006	-1,460	-1,280
2002-2011	-3,980	-3,770

RELATED CBO PUBLICATION:

Preserving the Nuclear Weapons Stockpile Under a Comprehensive Test Ban (Paper), May 1997.

The Department of Energy (DOE) is charged with preserving the long-term reliability and safety of U.S. nuclear weapons without testing them by exploding them underground. To carry out that task, DOE plans to continue operating both of its weapons-design laboratories (Los Alamos and Lawrence Livermore) and its engineering lab (Sandia). It will also construct several new facilities to provide data on the reliability and safety of nuclear weapons as they age. In ad-

dition, DOE will conduct "zero-yield" subcritical tests at the Nevada Test Site so it can keep enough skilled technicians there to be able to resume testing nuclear weapons by exploding them underground if the United States decides that doing so is in the national interest—a capability that President Clinton ordered DOE to retain.

DOE plans to spend an average of $5 billion a year over the next 10 years on nuclear weapons activities. To some observers, a budget of that size today is excessive.

This option would reduce the scope of those activities by consolidating the two design laboratories and halting all testing activities at the Nevada Test Site. However, it would preserve most of the other weapons programs, including the Dual-Axis Radiographic Hydrotest (DARHT) facility at Los Alamos and the National Ignition Facility (NIF) at Lawrence Livermore. Taken together, the changes in this option would reduce employment by about 2,000 people. They would also save $70 million in outlays in 2002 and almost $3.8 billion through 2011 compared with the program in the Clinton Administration's 2001 budget.

Those savings assume that weapons-design activities would be consolidated over five years at Los Alamos, which developed most of the weapons that are likely to remain in the stockpile. Lawrence Livermore's primary focus would become other scientific research. To ensure that the warheads it developed could be reliably maintained, some designers from Lawrence Livermore would be relocated to Los Alamos. However, a cadre of weapons scientists would remain at Livermore to act as an independent review team for Los Alamos's efforts. To provide them with challenging work, Livermore would keep large computational facilities for modeling the complex processes inside nuclear weapons and would build NIF as currently planned. (Alternatively, weapons activities could be consolidated at Lawrence Livermore, but the savings would be smaller.)

To some people, this option would cut some of DOE's weapons programs too deeply. They believe that those programs are the minimum effort necessary to maintain the nuclear stockpile without underground testing. In their view, scientists will need new facilities to obtain data on reliability that were formerly provided directly by such testing. They also contend that consolidation would reduce competition and peer review, result in the loss of some facilities that could not easily be transferred, and eliminate Lawrence Livermore's central unifying mission (and thus its motivation for excellence). For those reasons, President Clinton directed DOE to retain both labs. Closing the Nevada Test Site would increase the time needed to resume underground testing if the United States determined that such testing was necessary for national security reasons or if it discovered a serious problem with its stockpile that could be corrected only by such testing. Closing the test site would also stop scientists from conducting subcritical experiments to learn more about how aging affects the plutonium components in nuclear weapons.

To other people, this option would not cut deeply enough. In their view, keeping part of a second lab and building DARHT and the $3.5 billion to $4 billion NIF are unnecessary to support the nuclear stockpile. Furthermore, they claim, those facilities might allow DOE scientists to continue designing and testing weapons and circumvent the restrictions imposed by the Comprehensive Test Ban Treaty. Even if DOE has no such intentions, the perception of such a capability could make it difficult to convince countries such as India, which are critical of the United States' plans to preserve its nuclear weapons under a test ban, that the United States has really given up designing new weapons. Critics also argue that NIF should be funded outside the nuclear weapons program if it can help scientists understand how to harness fusion for civilian energy, as supporters claim.

Finally, some analysts are fundamentally opposed to a U.S. moratorium on testing (which will become permanent if the United States ratifies the test ban treaty). They contend that the only way to ensure the reliability of U.S. nuclear weapons is to explode those weapons underground. They also worry that by halting the development and testing of new types of weapons, the United States will lose the skilled people necessary to preserve the stockpile. This option does not address the test ban directly, but the cuts it would make to the laboratories would probably be resisted by opponents of the test ban. □

Option 050-19
Fully Fund the National Missile Defense Proposed by the Clinton Administration

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	420	90
2003	470	240
2004	470	360
2005	220	390
2006	640	470
2002-2006	2,220	1,550
2002-2011	3,750	3,580

RELATED CBO PUBLICATION:

Budgetary and Technical Implications of the Administration's Plan for National Missile Defense (Paper), April 2000.

The Clinton Administration began developing a limited system to protect the United States from attack by ballistic missiles but did not commit to deploying it. After reviewing the progress of the program and the potential threats, President Clinton decided in September 2000 to defer deployment of the system. Any decision on deployment will now be made by President Bush. In April 2000, the Congressional Budget Office estimated the cost to field the Clinton Administration's national missile defense system at $29.5 billion through 2015. It concluded that the Administration's fiscal year 2001 budget request did not include enough money to develop and deploy the initial system—with 100 interceptor missiles—that the Administration envisioned.

This option would fully fund deployment of that system. The interceptor missiles would be located at a single site in Alaska; a battle-management center and a new X-band radar would also be constructed there. In addition, five existing early-warning radars would be upgraded to provide early tracking of missile attacks. The resulting system, known as Expanded Capability 1, would defend against tens of warheads that perhaps were accompanied by rudimentary countermeasures, according to the Department of Defense. (DoD is also considering a Capability 2 system that it says would be able to handle warheads with more sophisticated countermeasures.) The system could be functional—with 20 interceptors—by the end of 2006 or 2007 and could be completely deployed by 2008.

CBO estimated that deploying the Expanded Capability 1 system in Alaska would cost about $3.8 billion more in budget authority over the next 10 years than the Clinton Administration included in its 2001 budget plan. About $0.7 billion of that increase would come from anticipated growth of weapons production costs, another $0.7 billion from buying additional interceptors and upgrading the radars, $0.9 billion from increased construction costs, and the remaining $1.5 billion from increased operations and support. Those estimates from April 2000 may now be too low, however. A combination of delays in testing and efforts by the Clinton Administration to reduce the program's technical risk (including a more challenging testing program) may have increased the funding requirements well beyond the levels included in this option.

Supporters of quickly deploying a national missile defense argue that the threat of an attack on the United States by intercontinental ballistic missiles from developing countries is imminent, if it does not exist already. They cite North Korea's test of a Taepo Dong missile as evidence that hostile nations in the developing world will soon be able to target the United States. A commission established by the Congress to evaluate that threat (known as the Rumsfeld Commission after its chairman, Donald Rumsfeld) reported that the threat could emerge quickly and perhaps without warning. In addition, hostile countries might try to limit the United States' freedom of action overseas by deploying a few long-range missiles (on the theory that U.S. leaders might be reluctant to aid their allies if the U.S. population was vulnerable to a ballistic missile attack). Supporters argue that a national missile defense could prevent such a ploy from working.

Other advocates of deploying a national missile defense would not support this option, however. Some believe that the United States should deploy more extensive defenses, either on the ground or in space. They worry about accidental launches of Russian missiles—particularly given the effect of economic collapse on that country's command-and-control system—and argue that the United States must do everything it can to protect itself from such attacks. Still other supporters of a national missile defense believe the system should be based on ships.

Opponents of an immediate decision to build a national missile defense argue that the United States should wait until the threat warrants such an expensive investment. The longer the United States waits, they say, the better the technology will be. Some critics maintain that the hit-to-kill technology that DoD is pursuing is not technically feasible now because it is too vulnerable to simple countermeasures. They point out that none of the flight tests conducted so far have demonstrated the system's ability to counter realistic countermeasures. Nor would the system protect against shorter-range ballistic or cruise missiles that could be launched from ships off U.S. coasts. Other opponents believe that the United States' nuclear deterrent has been and will continue to be more effective at protecting the United States than any missile defense.

Some critics also contend that deploying a national missile defense would seriously harm other aspects of U.S. security. They worry most about Russia's reaction: such a defense would violate the Anti-Ballistic Missile (ABM) Treaty as it now stands, which many people in the United States and Russia consider the cornerstone of nuclear arms control. If the United States abandoned that treaty, Russia might refuse to reduce the size of its nuclear force. It might even increase that force to ensure that it could overcome the U.S. defense system. Moreover, the hard feelings that a missile defense might create in Russia could jeopardize ongoing cooperative efforts to address U.S. concerns about nuclear proliferation (see option 050-22). Opponents of a national missile defense also fear that China would respond by sharply increasing the number of weapons it could use to strike the United States and increasing the day-to-day readiness of its forces to launch quickly. If the North Korean threat is driving the United States to deploy a national missile defense, one approach to that threat that might address Russian concerns and be more effective against countermeasures would be to deploy a boost-phase defense near Vladivostock, Russia (as Richard Garwin from the T.J. Watson Research Center and Ted Postol of the Massachusetts Institute of Technology have proposed).

The ABM treaty and Russia's possible reaction to a U.S. national missile defense are hotly debated even among supporters of quick deployment. Some argue that the treaty is a product of a bygone era and should be abandoned. In their view, it is no longer in effect because one of the signatories, the Soviet Union, no longer exists. Other supporters of a national missile defense believe that the treaty is still in force but can be modified through negotiations to allow the planned system to be deployed without jeopardizing arms control efforts and nuclear stability. □

Option 050-20
Fully Fund the Navy Theater Wide Missile Defense System

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	130	60
2003	240	160
2004	350	270
2005	360	300
2006	900	550
2002-2006	1,980	1,340
2002-2011	3,470	3,390

The United States is developing two defenses against longer-range theater ballistic missiles: the Army's land-based Theater High Altitude Area Defense (THAAD) and the Navy's ship-based Theater Wide system. The Clinton Administration's budget plan for fiscal year 2001 did not include enough money to deploy both of those systems as soon as possible.

The Administration fully funded the THAAD program, but its budget for the Navy Theater Wide system did not provide funds for deployment. Instead, it provided for completing part of the system—the Aegis LEAP Intercept flight-test program—in 2002 and sustaining the industrial base for the system through 2005. At the end of the flight-test program, the Department of Defense plans to determine further funding for the Theater Wide system on the basis of flight-test performance.

This option, by contrast, would fully fund both THAAD and the Navy Theater Wide system. (Because the funding in the Clinton Administration's 2001 budget reflects the projected requirements for deploying THAAD, not the Navy program, this option would pay for deployment of the Navy system.) Doing so would cost about $3.5 billion in budget authority over 10 years.

Those two systems, known as upper-tier defenses, are designed to provide an upper layer of protection for broad areas within a theater of combat. They complement lower-tier defenses, such as the Patriot and Navy Area systems, which protect relatively small areas. (Theater defenses are distinct from national missile defenses in that only the latter can protect against missiles with intercontinental ranges.) The THAAD program is well established: the Army and the Ballistic Missile Defense Organization (BMDO) have been developing it for more than 10 years. The Navy Theater Wide program is a relative newcomer. It would be deployed on Aegis cruisers and would consist of an upgraded Aegis radar and a number of Standard missiles carrying the lightweight exoatmospheric projectile (or LEAP) kill vehicle. To be fully effective, the system would also require that the United States deploy the 24 satellites that make up the low-orbit segment of the Space Based Infrared System.

Under this option, an initial version of the Navy Theater Wide system—called Block1A—would be funded for deployment by 2006. More-capable versions of that initial Block 1 capability, Block 1B and Block 1C, would be funded for deployment in 2008 and 2010, respectively. (A significantly more capable, Block 2 system could be deployed later, but those costs are not included in this option.) In addition, THAAD would be deployed in 2008, as under the Clinton Administration's 2001 budget plan.

The primary motivation for fully funding both programs is that a number of countries—including North Korea, Pakistan, Iran, and India—are developing and deploying ballistic missiles with ranges of more than 1,000 kilometers, which will begin to exceed the capability of lower-tier defenses. Both upper-tier systems have unique capabilities that would help protect U.S. forces and allies from such longer-range missiles. THAAD could protect forces on land, particularly those away from coastal regions. The Navy upper-tier system could protect areas near coasts and might provide the only upper-tier defense in a theater of combat until THAAD could be set up. The Navy system is also uniquely suited to defend Japan from North Korea. A few Aegis ships off the coast of North Korea could protect all of Japan by intercepting missiles as they left the atmosphere during their ascent phase. For an extra layer of protection, ships off the Japanese coast could intercept any surviving warheads as they reentered the atmosphere near that country. In some cases, the Navy upper-tier system could also intercept missiles launched by Iran against Israel or Saudi Arabia, although the locations of the ships would not be ideal.

Fully funding the Navy upper-tier system has other potential advantages. In some situations, the system could be very effective against missiles that carry many small warheads. Those so-called submunitions can easily overwhelm ground- and sea-based defenses located near the targeted areas because instead of having to intercept one warhead, the defenses must contend with dozens or even hundreds. If the Navy upper-tier system could intercept such missiles during their ascent phase, it could destroy them before they had a chance to deploy their submunitions. In addition, according to BMDO, the Navy system has the potential in some scenarios (if it is upgraded to the Block 2 configuration by improving its kill vehicle) to defend far western parts of the United States, such as Alaska and Hawaii, from the Taepo Dong II missile that North Korea is developing.

Those advantages must be balanced against several disadvantages. First, although the Navy upper-

tier system can protect large areas, it is more susceptible to countermeasures than THAAD, which can operate in the upper portions of the atmosphere as well as in space. Discriminating between actual warheads and objects designed to look like warheads (such as lightweight balloons) is more difficult outside the atmosphere. In addition, the kill vehicle on the Navy interceptor missiles will be relatively simple and less able to distinguish warheads than the larger exoatmospheric kill vehicle that is being developed for a national missile defense.

Second, some analysts worry that the Navy upper-tier system could violate the Anti-Ballistic Missile (ABM) Treaty. Although the United States and Russia negotiated an agreement that would allow the United States to designate that system as a theater missile defense, the Clinton Administration did not submit the agreement to the Senate for ratification, and some Senators have serious concerns about the substance of the agreement. Other analysts contend that concern about compliance with the ABM treaty is moot: the treaty is no longer in force, they argue, because the Soviet Union no longer exists.

Third, using the Navy upper-tier system (in its Block 2 configuration) would not be the only option for intercepting North Korean missiles aimed at the United States. One alternative would be to use the Air Force's Airborne Laser—which could be available a few years earlier than the Block 2 system. Another option would be to deploy a ground-based defense near Vladivostock, Russia, that could intercept those missiles during their boost phase, when they would be easier to detect and kill and when countermeasures would be less difficult to overcome. □

Option 050-21
Establish a Space-Based Capability to Search For and Track Adversaries' Spacecraft

The United States is the leading "spacefaring" nation of the world. The U.S. military has incorporated satellites into almost all levels of its operations: from providing early warning of long-range missile attacks to guiding bombs as they fall toward their targets.

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	10	10
2003	60	40
2004	60	50
2005	70	60
2006	110	90
2002-2006	300	250
2002-2011	620	590

Although using space in those ways has given the United States extraordinary capabilities, it has also made the country vulnerable if its satellites are attacked. Potential adversaries have noted the advantage that satellites gave the United States in the Gulf War, and they are proceeding with their own plans to utilize space. The United States cannot fully respond to such threats without accurate and timely knowledge of where other countries' spacecraft are located.

This option would build and operate a fleet of three satellites dedicated to searching for and tracking the satellites of potential adversaries in low-Earth orbit or higher. Doing that would cost the Department of Defense a total of $620 million in budget authority over 10 years. The sensors on the three new satellites would be based on the same technologies being used on the United States' only current space-surveillance satellite. Furthermore, the satellites would be relatively small, since they would be dedicated to one task. Thus, their launches could be conducted with only two space-launch vehicles; after the first satellite had been put into orbit for a brief testing period, the second and third could be launched on a single Delta II rocket. Once the fleet was in orbit, operating it would cost less than $10 million a year. Each satellite would have a lifetime of seven years (the estimated costs of this option include funding for long-lead items for replacement satellites).

Although space may appear to be a borderless void, there are distinct regions above the Earth that accommodate some purposes better than others.

Thus, simply knowing a satellite's altitude can give a good indication of its intended mission. Photo reconnaissance satellites are placed in low-Earth orbits to optimize their views; navigational satellites, such as the Global Positioning System, are in medium-Earth orbits a little farther out; and communication satellites are often even farther out in geostationary orbits, in a part of the region known as deep space. Other details of a satellite's orbit—such as the longitude over which it spends most of its time—might indicate the intentions and interests of its owner. For example, shortly before the end of the Gulf War, Russia put an early-warning satellite into geostationary orbit roughly over the combat zone. That is not the nation's highest-priority position, which can be determined by looking at how often it places a satellite there. (Russia eventually moved this satellite to its highest-priority position—over the Atlantic where it can watch U.S. missile fields.) Positioning the satellite near the Gulf War combat zone at that time possibly signaled Russia's interest in the region.

The United States uses a network of surveillance facilities to search for and track spacecraft orbiting the Earth. Those facilities include radars and optical telescopes based on the ground as well as the existing space-based telescope, which joined the surveillance network in 1998. The ground-based assets, however, face a number of limitations on when they can operate, the size of the objects they can see, and how far into space they can search. Radars can view low-altitude satellites (including most photo reconnaissance satellites), but they can detect only the largest satellites in geostationary orbits, because of the long distances—nearly 50,000 miles—that the radar beams must travel. Thus, the United States uses optical telescopes to search for and track such high-altitude satellites. But optical telescopes based on the ground are effective only at night and in clear weather.

The U.S. space-surveillance network tracks nearly 10,000 objects—orbital debris as well as satellites. The parameters that describe the orbits of those objects allow the Air Force to predict their future positions. But those parameters must be updated periodically with new observations because a host of factors—from atmospheric variations to human actions—can cause a satellite's orbit to change substantially. The Air Force updates the orbits of Russia's photo reconnaissance satellites every seven hours, on average. Satellites in higher orbits are tracked less often: every 24 hours, on average, in the case of Russia's early-warning satellite in geostationary orbit.

On some occasions, however, several days have gone by without the U.S. network tracking the Russian early-warning satellite. Such gaps might pose a danger not only for U.S. space assets—if the Russian satellite had been a space mine, it could have maneuvered close to a U.S. satellite and exploded—but also for U.S. ground forces. In 1998, a Russian early-warning satellite in geostationary orbit reportedly observed the flashes from attacks on Baghdad by U.S. Tomahawk missiles. Observations of such flashes from munitions can be used to increase battlefield awareness and directly assist combat troops.

Further, a global trend is taking place toward satellites that are smaller but still capable of making sophisticated observations. That trend poses at least two distinct dangers to the U.S. military. First, it "lowers the bar" for developing countries to orbit satellites, because less powerful rockets can be used. Second, small satellites—which some analysts worry could be smaller than a bowling ball—are much more difficult to detect in the vastness of space or to track once they have been found.

The fleet of three satellites that this option envisions would significantly improve the U.S. space-surveillance network by allowing virtually all potential enemy spacecraft to be tracked and their location updated at least every six hours—and all satellites in geostationary orbits at least every 15 hours. Moreover, that fleet is expected to be capable of detecting and tracking near-Earth satellites smaller than a bowling ball.

Critics of this option could point out that many potential U.S. adversaries are no match for the United States in terms of being able to orbit sophisticated military satellites. For example, North Korea has tried to develop a space-launch capability along with an intercontinental ballistic missile, but it failed in its first attempt to orbit a satellite. Thus, critics might argue, the United States can afford to wait until the threat is more pressing before adding to its space-surveillance network.

Other opponents might argue that this fleet of spacecraft would be too limited in its ability to track photo reconnaissance satellites. (Because of interference from sunlight reflected off the Earth's surface, the window for tracking such spy satellites might be limited to a half-dozen or so brief intervals each day, the Congressional Budget Office estimates.) Those critics might feel that photo reconnaissance satellites are the only near-term space threat that the United States should be concerned about. In their view, a preferable option might be to add satellite-tracking sensors to the planned fleet of low-orbit satellites in the Space Based Infrared System (SBIRS), which is intended to detect and track warheads that are coasting through space. Giving that system the ability to track photo reconnaissance satellites in low-Earth orbit could be less expensive than launching a new fleet.

Still other critics of this option would argue that the U.S. military should have a fleet of satellites dedicated to tracking spacecraft but that the positioning of the satellites in this option would not be optimal for detecting and tracking satellites in low-Earth orbit. They would call for adding a fourth new satellite that would be placed in an orbit varying from very close to the Earth to very far away. That satellite would spend most of its time far from the Earth and could search for reconnaissance satellites as they came around the Earth's edge.

Proponents of this option, by contrast, might argue that the spacecraft of potential adversaries already pose a significant threat: they could gather information on U.S. ground forces and even destroy U.S. satellites. In that view, the United States should not only prepare for emerging space powers like North Korea but also carefully watch Chinese and Russian satellites at all altitudes.

Proponents could also argue that launching three satellites dedicated to space surveillance would be better than trying to add another requirement to the low-orbit SBIRS satellites, which already have a difficult and complex task just finding and tracking missile warheads. An extra telescope, sensor, and associated computers would add a new level of complexity to the communications and control of SBIRS and might require redesigning the architecture of the whole system. Moreover, proponents would say, the improvements that a new space-surveillance fleet would make in searching out and tracking potential adversaries' higher-orbit satellites are important enough to justify a dedicated system. Further, they might argue, the system could adequately track known low-orbit satellites if its resources were allocated carefully. □

Option 050-22
Increase Funding for Nuclear Nonproliferation Efforts in Russia

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	40	30
2003	40	40
2004	40	40
2005	40	40
2006	50	40
2002-2006	210	190
2002-2011	460	440

RELATED CBO PUBLICATION:

Cooperative Approaches to Halt Russian Nuclear Proliferation and Improve the Openness of Nuclear Disarmament (Memorandum), May 1999.

Since the collapse of the Soviet Union in 1991, the United States has been concerned about the security of the nuclear materials and weapons in the former empire. Social upheaval in the former Soviet republics and the loosening of the Soviet-style security apparatus have left nuclear weapons, nuclear materials, and weapons-design expertise vulnerable to proliferation. This option would increase funding for programs aimed at reducing those threats.

Over the past eight years, the United States has instituted several programs to help Russia and the former Soviet republics prevent such proliferation. Those programs include:

- The Department of Defense's Cooperative Threat Reduction program (also known as Nunn-Lugar), which is helping Russia secure its existing nuclear weapons as well as the fissile materials (including highly enriched uranium and plutonium) from weapons it is dismantling under the Strategic Arms Reduction Treaties;

- The Materials Protection, Control, and Accounting (MPC&A) program of the Department of Energy, which has helped the former Soviet states protect their far-flung stocks of weapons-usable nuclear materials; and

- Other programs aimed at keeping weapons scientists in Russia and helping the former Soviet states halt nuclear smuggling.

In all, the United States spends about $800 million a year on those efforts.

This option would increase funding for two of those nuclear nonproliferation programs: the MPC&A program and the Department of Energy's Nuclear Cities Initiative (NCI). Specifically, it would boost funding for both programs by 20 percent over the amounts appropriated for fiscal year 2001. That increase would cost a total of $460 million in budget authority through 2011 ($400 million for MPC&A and $60 million for NCI).

The additional funding for the MPC&A program would help accelerate the process of securing fissile materials in Russia and consolidating them so they are stored at fewer sites. It would also help ensure that storage sites that have already been secured will remain so in the future. The increases for the NCI would go to creating additional jobs for displaced weapons scientists and engineers and creating further commercial opportunities in Russia's "nuclear cities" (the formerly closed, isolated towns devoted to weapons research and production).

Several analysts have argued that the United States should step up its efforts to address the proliferation threat from Russia. Those efforts are critical, they say, because of continued economic troubles in Russia, which mean that nuclear workers often go unpaid for months at a time; the rise in organized crime in that country; and the persistent efforts of some rogue nations and terrorist groups to develop weapons of mass destruction and the means to deliver them.

Proponents of this option would argue that the MPC&A program in particular requires greater attention and resources, since vast stockpiles of fissile materials remain in Russia and access to those materials is the primary obstacle for a country bent on developing nuclear weapons. Moreover, they argue, the scope of the problem has turned out to be much greater than originally anticipated, but budgets and plans have not increased accordingly. Other supporters would emphasize the need to give nuclear weapons scientists and other key workers in the nuclear cities less incentive to sell their skills abroad out of financial desperation.

Critics of expanding U.S. efforts would argue that the United States is already doing enough to reduce the proliferation threat from Russia. Some would also contend that although the problem is important, other nations should contribute greater resources to countering the threat of Russia's nuclear materials and expertise falling into the wrong hands. After all, they would argue, nuclear weapons proliferation is a threat not only to the United States but also to its friends and allies in Europe, Asia, and elsewhere.

Still other critics might argue that efforts to reemploy workers in the nuclear cities face potential problems. Trying to create vibrant civilian economies in those cities could prove difficult, particularly given Russia's continuing economic troubles. Moreover, it can be hard to establish that U.S. funds are directly serving nonproliferation goals by effectively reducing the incentives for scientists and other nuclear workers to help countries that are seeking nuclear weapons. □

Other Emerging Threats and the Revolution in Military Affairs

As it formulates plans for research and development and sets priorities for modernization, DoD must be keenly aware of emerging threats and devise new ways to cope with them. DoD officials and other analysts have identified a number of those threats in

analyses such as the 1997 Quadrennial Defense Review, the National Security Strategy, the Strategic Assessment, and the Report of the National Defense Panel. In addition to the threat just discussed—the proliferation of nuclear, biological, and chemical weapons and the means to deliver them—two other major emerging threats are often cited:

- Advanced weapons that could threaten the ability of U.S. forces to enter a theater (for example, enemy air-defense systems and weapons directed at choke points, such as straits, ports, and airports); and

- Information warfare (disrupting the military's ability to communicate and transmit information as well as the abilities of civilian agencies and businesses).

To counter those threats, some of the options below would improve the military's reconnaissance systems. Another would add to the number of surface-launched cruise missiles that the United States could deploy in a theater. Yet another option would improve the Navy's ability to prevent other countries' diesel-electric submarines from hampering U.S. naval operations.

In addition to those approaches, improving precision-guided munitions would add to the United States' ability to quickly identify, target, and destroy conventional weapons used to threaten deploying U.S. forces. Moreover, research and development programs could be directed toward establishing improved capabilities in such areas as detecting and disabling sea mines, repairing runways, and quickly reestablishing the ability (if it was lost) to deliver equipment and supplies from ship to shore.

Such initiatives could be part of a broader effort by DoD to pursue technological advances that can fundamentally transform the way military operations are conducted—what many experts call the revolution in military affairs. Technological advances (such as cannons and gunpowder, steam-powered ships, and aircraft) have clearly played a key role in past military revolutions. And certainly, the past 20 or so years have seen advances in sensor and information technologies that also appear to have major implications for warfare.

Technological trends affecting the military are part of larger forces shaping society as a whole. Those trends include high-speed, distributed computational power; dramatic increases in communication capabilities; networked communications (ranging all the way from local office networks to the Internet); microminiaturization of machines; and advances in biological sciences, such as genetic engineering. All of those trends have potential military applications, and DoD's lead innovator, the Defense Advanced Research Projects Agency, and its service counterparts are actively pursuing them.

Technological advancements also carry with them additional risks and complexities. Any new advance—such as a battlefield network linking all active forces with surveillance assets and commanders—becomes a target of attack for a sophisticated enemy. The increased complexity and interconnectedness of modern industrial society also present opportunities for attack, and if the enemy is less advanced, it is at less risk from a similar counterattack. Furthermore, change requires more than technological advances to be effective. It can require changes in organization, tactics, doctrine, and training.

Several of the options that follow relate to DoD's efforts to incorporate new technologies into its operations and equipment, including options that would purchase more unmanned air vehicles as reconnaissance assets or launch satellites into space for better communications on the battlefield.

Option 050-23
Buy an Additional MILSTAR Communications Satellite

The Air Force's Military Strategic and Tactical Relay (MILSTAR) satellites provide protected communications during both strategic (intercontinental) and tactical (theater) conflicts. Two older satellites are already in orbit, though nearing the end of their service life. The Air Force had planned to put four redesigned MILSTAR satellites into orbit over the next several years; it says that number is necessary to maintain complete global communications coverage. Those four satellites—referred to as flight 3 through

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	280	140
2003	430	350
2004	270	350
2005	0	130
2006	0	0
2002-2006	980	970
2002-2011	980	970

flight 6—are collectively known as the MILSTAR II program. But when the flight 3 satellite was launched in April 1999, it failed to reach its intended orbit. The Air Force considers that satellite a loss. Flights 4 and 5 are scheduled for launch in 2001, and flight 6 is expected to be launched in 2002.

This option would aim to get four MILSTAR II satellites into orbit at the earliest feasible date. Thus, it would begin production of a flight 7 satellite immediately and launch it by 2004 using an expendable launch vehicle. Purchasing an additional MILSTAR satellite could cost about $280 million in budget authority in 2002 and almost $1 billion over the next 10 years. That estimate assumes that the launch vehicle would cost about $200 million.

The focus of the MILSTAR program has changed over the years. The first two satellites—flights 1 and 2—were designed to meet the national command authority's requirements for low-data-rate (LDR) communications. Such communications use lower bandwidths that are less likely to be disrupted by nuclear explosions. Those two satellites were launched into orbit in 1994 and 1996. Since then, because the threat of nuclear war has declined greatly in the post-Cold War era, MILSTAR satellites have been redesigned to emphasize their usefulness for tactical forces. For example, later satellites are designed to provide not only LDR capability but also medium-data-rate (MDR) communications, which use higher bandwidths that allow faster processing of information. (MILSTAR satellites can also overcome jamming that would overwhelm other, less robust communication systems.) The average service life of the satellites is about seven years. To replace them, the Air Force is developing advanced extremely high frequency (EHF) satellites, which it plans to begin launching around 2006.

Proponents would argue that buying an additional MILSTAR II satellite now is essential, for three reasons. First, the Air Force says four of those satellites are necessary to ensure 24-hour MDR communications capability over trouble spots around the globe. Consequently, the loss of the flight 3 satellite means at least a 25 percent degradation in that capability by 2006. According to the Air Force, current satellites lack excess capacity, and the enhanced EHF program cannot be accelerated enough to close the gap in coverage significantly, so that gap would persist for at least five years. Second, the Army has already made substantial investments in ground terminals for MILSTAR MDR communications and has eliminated many of its older LDR terminals in anticipation of the switch. Third, construction of the last two MILSTAR satellites is expected to be finished by 2001. By purchasing another satellite now, the Air Force could avoid the significant cost increases that would result from shutting down production temporarily.

Opponents of this option would argue that closing the anticipated gap in coverage is not critical enough to warrant spending $1 billion on another MILSTAR satellite. Rather, they would argue, devoting that money to the next-generation EHF satellites would make more sense given the limited resources that the Department of Defense might face in the next decade. In fact, the Air Force has proposed accelerating the first EHF launch to 2004 by terminating competition in favor of a sole-source award to a team consisting of the same contractors now competing for the contract. In the meantime, opponents might say, the Air Force could fill the gap in strategic communications for several years with its two earlier LDR satellites and could rely on existing Navy satellites to fill some of the gap in tactical communications. □

Option 050-24
Increase Funding for Tactical UAVs

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	133	38
2003	105	91
2004	114	104
2005	114	124
2006	96	126
2002-2006	562	473
2002-2011	1,089	1,061

RELATED CBO PUBLICATION:

Options for Enhancing the Department of Defense's Unmanned Aerial Vehicle Programs (Paper), September 1998.

The Department of Defense maintains that one of its top priorities in the area of reconnaissance and surveillance is to give brigade commanders access to unmanned aerial vehicles (UAVs). The Army has selected the Shadow UAV system to meet the needs of its brigade commanders. The Hunter, a more capable and highly reliable UAV, could do so for the Army's division and corps commanders. The Navy, for its part, is examining several alternatives to replace its current UAV systems, which are old, expensive to maintain, and hazardous to shipboard operations since they are powered by gasoline rather than less dangerous diesel fuel.

This option would provide 40 Shadow tactical UAV systems for the Army's brigades, 14 Hunter systems for the Army's divisions and corps, and 32 diesel-powered UAV systems with vertical take-off and landing (VTOL) capability for the Navy's aircraft carrier battle groups, amphibious ready groups, and surface combat ships. Both the Army and the Navy are planning to spend about $670 million on UAV systems over the next five years, but this option would purchase more systems than they envision. Consequently, it would cost $133 million in budget authority in 2002 and a total of almost $1.1 billion over 10 years. (For an option relating to Air Force UAVs, see option 050-04.)

Unmanned aerial vehicles are a valuable asset to a commander because they can conduct reconnaissance and surveillance missions without risking the lives of an aircrew. UAVs could let brigade commanders view nearly instantaneous video footage of what lay just over the next hill. Higher-echelon commanders could use UAVs to send back imagery of enemy troop movements farther away. UAVs could perform other useful missions, such as locating and identifying particular targets, designating targets for attack by precision munitions, assessing the damage that targets have suffered after an attack, serving as communications relays, jamming an enemy's electronics and communications systems, and operating in environments too dangerous for humans, including areas contaminated by nuclear, chemical, or biological agents.

Although the Army and Navy have said they want to give their forces UAV capability, unmanned aerial vehicles do not appear to have had a high priority. After the Army terminated the Hunter program in 1996, it placed seven Hunter systems (with eight air vehicles apiece) in storage. It has since used most of two of those systems for training, and their performance has been considered outstanding. Nevertheless, the Army appears unwilling to use those systems to give its corps and division commanders UAV capability (although it did use Hunter systems during operations in Kosovo). By reorganizing its existing Hunter assets and buying a little more equipment, the Army could equip 10 divisions with Hunter systems of four air vehicles each and four corps with systems of six air vehicles each.

For their part, the Navy and Marine Corps have been operating Pioneer UAVs since the 1980s and are looking for a replacement. They are testing several UAVs with VTOL capability to fulfill their requirements, but the Navy does not plan to commit funds to buy a new system until at least 2003. This option would acquire greater UAV capability than the Navy now plans.

The option would have several disadvantages, however. The first is the uncertain state of some UAV technology. Several years ago, the Army revised its requirements for tactical UAVs. During the fall of 1999, it held a flight competition of various UAV systems to determine which one could meet its revised requirements. The Shadow 200, built by the AAI Corporation, won that competition. But whether the Army will require more development of that system is not yet clear.

A second disadvantage is that using Hunter UAVs to provide reconnaissance for Army divisions and corps could impose a burden on those units. Hunters typically require a large amount of equipment and personnel to operate them. The Army expects that new UAV systems will be easier to support. However, reducing the size of Hunter systems may be possible with some modest changes and upgrades.

Third, the Army ultimately wants to use the same type of unmanned aerial vehicle to provide reconnaissance and surveillance at the brigade, division, and corps levels. Using Hunter and Shadow would mean having two different types of UAVs for those missions. But fielding a system to provide reconnaissance to divisions and corps might take the Army at least five years. The service could deploy Hunters within several months at a relatively low cost as an interim measure. □

Option 050-25
Convert the Four Oldest Trident Submarines to Carry Conventional Land-Attack Missiles

The Navy currently deploys 18 Trident strategic submarines, which carry nuclear-armed ballistic missiles. Ten of those submarines have D5 missiles, and the other eight are fitted with older C4 missiles, which are less accurate and have a shorter range than D5s (see option 050-17). The Navy plans to upgrade four of the submarines armed with C4s over the next several years so they can carry D5 missiles. It plans to retire the other four submarines (the *Ohio*, *Michigan*, *Florida*, and *Georgia*), which are the oldest Tridents. However, once they were refueled, those submarines would still have about 20 years of useful life. Consequently, some defense analysts, Members of Congress, and Navy officials have proposed converting those submarines from carrying nuclear-armed ballistic missiles to carrying conventional land-attack missiles and special-operations forces.

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	0	0
2003	850	430
2004	870	680
2005	100	400
2006	180	290
2002-2006	2,000	1,800
2002-2011	3,420	3,330

RELATED CBO PUBLICATIONS:

Budgeting for Naval Forces: Structuring Tomorrow's Navy at Today's Funding Level (Study), October 2000.

Rethinking the Trident Force (Study), July 1993.

This option would convert the four oldest Trident submarines to a conventional land-attack configuration rather than retire them. It would alter 22 of the 24 missile tubes on a Trident to carry seven conventional missiles each, for a total of 154 missiles per submarine. That would give each Trident about the same land-attack capability as all of the escort ships in an aircraft carrier battle group. The conventional missiles loaded on Tridents could be Tomahawk cruise missiles or a naval version of the Army Tactical Missile System (a short-range ballistic missile that can attack enemy infrastructure, armor, communications facilities, and command centers). Or, because the Navy will begin producing its advanced land-attack missile, the Tactical Tomahawk, in 2001 and the first two submarines would not be finished with their conversion until 2005, the submarines could be armed with those missiles. The Navy plans to buy 1,350 Tactical Tomahawks for various purposes. This option would purchase another 850 to

arm the submarines and to provide extra missiles for use in maintenance.

In addition to those changes, the four Tridents would receive a full suite of communications equipment as well as tactical-surveillance and intelligence-collection equipment to conduct reconnaissance missions before and during hostilities. Further, the space freed up by the two unused missile tubes would be converted to house special-operations forces.

Taken together, those changes would cost a total of about $3.4 billion in budget authority over 10 years compared with the Clinton Administration's 2001 budget request (which assumed that the Navy will retire the four oldest Trident submarines). Of that total, $2.5 billion would go to refueling the submarines' nuclear reactors, converting them to carry Tomahawk missiles, and purchasing the missiles. The remaining $0.9 billion would represent increased operating costs for the submarines.

By changing four submarines into conventional missile carriers, the Navy could make effective use of a valuable asset that would be well suited to support its doctrine of coastal warfare, as expressed in the white paper *Forward . . . From the Sea*. Some analysts fear that surface combat ships are becoming increasingly vulnerable to attack by antiship missiles in coastal waters. Trident submarines, by contrast, are very difficult to detect and therefore harder to attack. They could provide a powerful capability in areas of potential conflict without revealing their presence. Potential adversaries would know that retaliation for aggression could occur at any time and would be very difficult to prevent or preempt. That knowledge alone could prove an effective deterrent.

In addition, by deploying more Tomahawk missiles on converted Tridents, the Navy would free other ships to perform missions other than land attack. For example, in the future the Navy may need to dedicate a force of Aegis ships for missile defense (see option 050-20). Consequently, those ships may not be available to launch Tomahawks. The Navy is planning to buy 25 surface combatants over the next decade, each carrying dozens, if not hundreds, of land-attack missiles. Rather than buy all of those additional surface ships, the Navy could use the converted Tridents to perform land-attack missions that might otherwise have been done by some of those ships.

This option could have several drawbacks, however. For example, according to naval authority Norman Polmar, Trident submarines could be highly vulnerable to detection when preparing for and executing a land-attack mission. Attacking targets on land usually requires a great deal of communication and data transmission between ships and authorities on shore. That would be especially true if Tridents were carrying Tactical Tomahawk missiles, which were designed for quick reaction and in-flight retargeting. The high volume of communications traffic might enable an opponent to detect the submarine. The Trident could also be vulnerable to detection when it was launching its missiles.

Polmar also questions whether the Navy really needs additional capability to make stealthy strikes. He argues that such strikes were not particularly important during the Gulf War and in subsequent Tomahawk missile operations, and they may be no more valuable in the future. If that proves to be the case, the value of converting Trident submarines is less clear.

In addition, altering the Tridents would have implications for the size of the strategic weapons force. Under the terms of the Strategic Arms Reduction Treaties, ballistic missile submarines can only be converted to perform other missions using a specific method that eliminates their missile tubes. According to information provided by the Navy, converting the submarines to eliminate the missile tubes would nearly double the cost of this option. If the Navy converted the Tridents using a less expensive method that essentially left the missile tubes intact—as this option assumes—the United States would have to count those tubes under the terms of START and allocate "phantom" warheads to them. (Russia might agree to allow a less expensive conversion procedure, but that appears unlikely.) With respect to the force levels under START I, the additional phantom warheads would make no difference. But under START II—as currently negotiated—the United States would

be allowed to deploy only about 1,350 warheads on the Trident force, about 330 less than the Navy is planning. □

Option 050-26
Buy Six Diesel-Electric Submarines for Antisubmarine Warfare Training

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	600	40
2003	700	150
2004	700	300
2005	30	410
2006	50	410
2002-2006	2,080	1,310
2002-2011	2,500	2,410

The task of locating and destroying enemy submarines—antisubmarine warfare (ASW)—has changed substantially since the collapse of the Soviet Union. During the Cold War, the Navy directed its ASW efforts against Soviet nuclear-propelled submarines in the open ocean. Today, however, the most likely submarine threat to U.S. naval forces (and commercial shipping) is small, quiet, diesel-electric submarines, according to the Navy.

This option would buy six diesel-electric submarines that the Navy could use as an "aggressor" force in ASW training. Specifically, the option would buy two Russian Kilo class submarines and two German Type 209 submarines (the most common types the Navy might encounter) as well as two submarines with air-independent propulsion (AIP) systems. It would create two aggressor units of three boats each, one assigned to the Atlantic Fleet and one to the Pacific Fleet. Buying and operating those submarines would cost $2.5 billion in budget authority between 2002 and 2011.

Submarines with AIP systems represent perhaps the most dangerous threat ever to U.S. maritime interests. In the course of operations, diesel-electric submarines must come up to shallow water every few days to "snorkel" (that is, run their diesel engines to recharge their batteries and draw in fresh air). But AIP submarines can operate for up to 30 days at low speeds without surfacing. They, like regular diesel-electric submarines, are quiet when submerged—significantly quieter than the nuclear-powered submarines that make up the current U.S. attack fleet.

Some analysts argue that the Navy is not very good at locating diesel-electric submarines, especially in noisy, shallower waters near coastal areas. Exercises with allied navies that use diesel-electric submarines confirm that problem. U.S. antisubmarine units reportedly have had trouble detecting and countering diesel-electric submarines of South American countries. Israeli diesel-electric submarines, which until recently were relatively old, are said to always "sink" some of the large and powerful warships of the U.S. Sixth Fleet in exercises. And most recently, an Australian Collins class submarine penetrated a U.S. carrier battle group and was in a position to sink an aircraft carrier during exercises off Hawaii in May 2000. Thus, if a real opponent had even one such submarine with a competent commanding officer and crew, it could dramatically limit the freedom of action of U.S. naval forces in future conflicts.

The Navy cannot effectively use only its own submarines for ASW training. Because all of its attack submarines are nuclear powered, they are not valid surrogates for diesel-electric subs. They are much larger and have very different sonar "signatures" than the diesel-electric submarines found in other countries' fleets.

Opponents of this option would say that the United States does not need to buy its own force of diesel-electric submarines. Some critics might argue that the threat from other countries' diesel-electric subs is exaggerated. Most countries do not have the high-quality crews that are necessary for such submarines to pose an effective threat to U.S. naval forces. Other critics of this option might suggest that the United States could exercise more with allied navies,

especially since in the future it is likely to fight wars as a member of a coalition.

Supporters of this option could counter that although more interaction with allied navies might be useful, exercises with countries that have diesel-electric submarines are not frequent and are relatively limited in the amount of time available for ASW practice. By buying six diesel-electric submarines, the Navy would have a realistic opponent against which its forces could train in antisubmarine warfare on a regular basis. □

Ending or Slowing Some Acquisition Programs to Pay for New Initiatives

Finding the funds to support all of DoD's desired initiatives could be a problem. Part of the task of acquisition managers is to identify systems in development or production that no longer fit well with DoD's new strategic or operational concepts and to cancel those systems. A few options that would do so are included below.

Army systems are particularly subject to reexamination because the Chief of Staff, General Eric Shinseki, has called for a new Army built around units with lighter equipment that would be more deployable to small-scale operations as well as to major theater wars (see option 050-13). The heavy armored forces of the current Army are well suited to conventional land wars. But Army leaders now feel that those forces are simply too heavy and require too much support to be dispatched quickly around the world.

The options below would affect the modernization programs of the other military services as well. In particular, all of the services are seeking to develop and purchase new and more capable aircraft to replace aircraft operated today. Proponents of the options to end or slow such programs would argue that today's equipment is already more capable than that of potential adversaries and that any problems caused by aging can be addressed in other ways, such as extending service lives or selectively buying new production units of today's equipment types.

Option 050-27
Cancel the Army's Comanche Helicopter Program

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-167	-154
2003	-434	-355
2004	-281	-385
2005	-536	-296
2006	-642	-420
2002-2006	-2,059	-1,610
2002-2011	-8,565	-7,089

RELATED CBO PUBLICATIONS:

An Analysis of U.S. Army Helicopter Programs (Study), December 1995.

Options for Enhancing the Department of Defense's Unmanned Aerial Vehicle Programs (Paper), September 1998.

Many of the Army's helicopters are beyond the end of their useful service life. Initially, the Army had planned to replace some of those older scout, attack, and utility helicopters with more than 5,000 new Comanche (RAH-66) helicopters. Comanche has had a troubled development program, however. The utility version of the helicopter was dropped in 1988 because the program had become too costly. In 1990, the size of the planned purchase was reduced from more than 2,000 aircraft to just under 1,300. Later, the Army delayed the projected start of Comanche production from 1996 to 2005.

Those changes have caused the procurement cost per helicopter to more than double since the program began—from $11.5 million (in 2001 dollars) in 1985 to $24.5 million, based on current Army estimates. With that cost growth, Comanche is now more expensive than the Army's Apache (AH-64) attack helicopter, even though it was developed to be less

costly to buy, operate, and maintain than other attack helicopters. Moreover, the General Accounting Office (GAO) and the Department of Defense's Inspector General (DoD IG) have stated that costs could grow by as much as another 30 percent. In addition, GAO has reported that there are significant risks that Comanche will enter service later than expected and will not work as well as planned.

This option would cancel the Comanche program and would buy 500 Kiowa Warrior armed scout helicopters by the end of 2011. Net savings would total nearly $8.6 billion in budget authority during the 2002-2011 period.

The primary advantage of Comanche over existing aircraft is its sophisticated stealth, avionics, and aeronautics technologies. However, some analysts would argue that the helicopter, which was conceived at the height of the Cold War, will no longer face threats of the same scale or sophistication as those for which it was designed. According to the DoD IG, the Army has not reexamined the mission requirements for Comanche in any depth since the end of the Cold War (although it will need to do so in the context of the Army Chief of Staff's transformation plan). Comanche is intended both to serve as a scout for Apache and to fill the scout and light attack role independently. But whether Comanche really does have a unique role to play in Army aviation is unclear. The Army is planning to use Apaches in both scout and attack roles for the next 15 to 20 years, as it did successfully during the Persian Gulf War. The Army also used Kiowa Warriors in the Persian Gulf both as scouts for Apache and as light attack aircraft. Moreover, the Army could use unmanned aerial vehicles for some scout functions (see option 050-24). According to former Secretary of Defense William Cohen, U.S. forces used UAVs as scouts in Kosovo effectively and without the risk of losing aircrews.

If the Comanche program was cancelled, some of the savings could be used to fund a program to continue development of advanced helicopter technologies. However, abandoning the Comanche program would mean that the Army would have to rely on helicopters designed in the 1960s and 1970s for years to come. □

Option 050-28
Cancel the Army's Crusader Artillery Program

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-226	-131
2003	-334	-277
2004	-93	-262
2005	-13	-186
2006	-116	-154
2002-2006	-782	-1,009
2002-2011	-4,283	-2,764

The Army plans to spend $9.6 billion in the future to finish developing and procuring the Crusader self-propelled artillery system. It considers Crusader to be more technologically advanced and significantly more effective than the service's current artillery systems.

This option would cancel the Crusader program and instead provide funds to buy 480 German Panzerhaubitze (PzH) 2000 self-propelled howitzers (with resupply vehicles). The General Accounting Office (GAO) has identified the PzH 2000 as a viable alternative to Crusader. According to GAO, the German howitzer can fire eight to 10 rounds per minute, which is close to—but slightly below—the Army's requirement for Crusader. The PzH 2000's cross-country speed, sustained rate of fire, firing range, and rearming time are all within the ranges required for Crusader. Purchasing the PzH 2000 could hedge against potential threats now while freeing up $4.3 billion in budget authority over 10 years.

Supporters of Crusader cite several reasons why it is needed. Paladin, the Army's most modern artillery system, is too slow to keep up with other combat vehicles when armored forces advance. Paladin's

range is shorter than that of several foreign systems that might be fielded by potential adversaries. And its peak firing rate of four rounds per minute is significantly slower than the 10 to 12 rounds per minute that the Army says it needs. Crusader's current design includes an automated resupply system, which makes possible a higher firing rate and reduces the crew size to six from Paladin's nine. Crusader is also designed with more sophisticated automation and better crew protection than Paladin, and it incorporates many advanced artillery technologies.

Opponents cite three problems with Crusader. First, they question whether such a heavy system has a role in the lighter, more mobile force envisioned for the future Army. Second, some critics question whether Crusader will really deliver the promised improvements. Some of its subsystems embody technological innovations that have not yet been proved, and some have no backups in case of failure. (For example, if the automatic munition reloader fails, Crusader will not be able to fire at all; it cannot be loaded manually.) Those technical risks could prevent Crusader from meeting some of the Army's key requirements, in which case it might be no more effective than current systems. Third, Crusader's acquisition cost has increased from $17 million apiece to $21 million since the Army restructured the program and reduced its planned purchase from 1,138 to 480. That higher price tag brings into question Crusader's cost-effectiveness compared with other systems such as the PzH 2000.

Another issue is whether an Army undergoing transformation should invest in *any* new self-propelled artillery system. The Army's current plan calls for Crusader to be used in heavily armored brigades beginning in 2008. However, the Army also plans to transform those brigades to the lighter "objective force" structure starting in 2017 (see option 050-13). Investing in a system that may be used for only one-third of its expected service life might not be the best use of limited funds. □

Option 050-29
Reduce Procurement of the Virginia Class Submarine

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	0	0
2003	0	0
2004	-70	-10
2005	-460	-40
2006	-490	30
2002-2006	-1,020	-20
2002-2011	-3,350	-2,400

RELATED CBO PUBLICATION:

Budgeting for Naval Forces: Structuring Tomorrow's Navy at Today's Funding Level (Study), October 2000.

In 1999, the Chairman of the Joint Chiefs of Staff (CJCS) released a study calling for a force of 55 to 68 attack submarines, of which 18 should be the new Virginia class submarines by 2015. Subsequently, the Department of Defense decided that 55 submarines would be the force goal (up from 50 in the 1997 Quadrennial Defense Review). To modernize its submarine force, the Navy plans to buy one Virginia class sub per year from 2001 to 2006 and two or three per year between 2007 and 2011. At the same time, it plans to retire seven Los Angeles class submarines by 2008. Those subs would still have years of useful life remaining, however, if their nuclear reactors were refueled.

This option would refuel the reactors to keep those Los Angeles class submarines in service. It would procure 16 Virginia class submarines, three fewer than the Navy plans. Those changes would produce net savings of almost $3.4 billion in budget authority over the next 10 years and still maintain a force of at least 55 attack submarines through 2018. (For a discussion of increasing the attack submarine

force to 68, see option 050-01.) However, the Navy would have only 13 Virginia class submarines by the CJCS's target date of 2015.

Currently, the Navy's retirement schedule for Los Angeles class submarines is still based on the goal of maintaining a force of only 50 attack submarines, as the 1997 QDR recommended. However, the Clinton Administration's budget request for 2001 included about $1.1 billion for the Navy to enlarge its attack submarine force, either by refueling four of the seven Los Angeles class submarines slated for early retirement or by converting two Trident submarines to carry Tomahawk missiles (see option 050-25). The Congress has agreed to the enlargement plan in principle, providing $31 million in 2001 for some items that can be used to refuel a nuclear submarine. The rest of the money would be authorized in 2002 through 2005. The Navy has not yet determined which alternative to pursue, but it is likely to inform the Congress of its choice in 2001.

Although this option would save money, it would leave the Navy with a slightly less capable submarine force. The Virginia is the newest and most quiet submarine the Navy has ever designed —substantially quieter than the Los Angeles class. It will also have a more sophisticated array of sensors and a longer-lasting reactor. If the Navy leadership chooses to refuel four Los Angeles class subs, the submarine force would consist of 34 to 36 Los Angeles class submarines, 16 Virginia class submarines, and three Seawolf class submarines by 2015, under the Navy's current plan. The Navy would achieve the CJCS's goal of 18 Virginia class submarines in 2016. Under this option, by contrast, the Navy would have 38 to 39 Los Angeles subs, 13 Virginias, and three Seawolfs by 2015, and it would not reach 18 Virginias until 2017. For the next several decades, the Navy would have fewer Virginias under this option than under its current plan. □

Option 050-30-A
Defer Purchases of the Marine Corps's V-22 Aircraft

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	0	0
2003	0	0
2004	0	0
2005	0	0
2006	-551	-83
2002-2006	-551	-83
2002-2011	-3,475	-2,403

The V-22 aircraft, which entered production in 1997, is designed to help the Marine Corps perform its amphibious assault mission (seizing a beachhead in hostile territory) and its subsequent operations ashore. The V-22 can transport up to 24 marines, or 10,000 pounds of their equipment, from ship to shore. The plane's tilt-rotor technology enables it to take off and land vertically like a helicopter and, by tilting its rotor assemblies into a horizontal position, to become a propeller-driven airplane when in forward flight. As a result, the V-22 can fly faster than conventional helicopters. The Marine Corps argues that the plane's increased speed and other design features make it less vulnerable than other aircraft when flying over enemy terrain and enable it to provide over-the-horizon amphibious assault capability. In addition, the V-22 is designed to fly longer distances than conventional helicopters without refueling. Thus, it can fly directly to distant theaters rather than being transported on planes or ships, as many helicopters are.

Despite all of those advantages, the Bush Administration tried in 1990 to cancel the V-22, largely because of its price tag. Each aircraft bought for the Marine Corps is expected to have a unit procurement cost of $65 million, on average—considerably more than most conventional helicopters. That cost is about 7 percent higher than the Marine Corps expected last year, and it seems likely to grow further. Nevertheless, the Congress has continued to fund the V-22, and the Marine Corps plans to buy a total of 360 planes. (The Air Force may eventually buy 50 V-22s for its special-operations forces, and the Navy

plans to buy 48 for combat search-and-rescue missions and for logistics support of its fleet.)

The Marine Corps expects to acquire several other planes at the same time. During many of the years that it is purchasing V-22s, it also plans to buy large numbers of Joint Strike Fighters to replace its short-range bombers and its F/A-18 fighter/attack aircraft. JSFs are expected to be relatively inexpensive as tactical fighters go (perhaps 60 percent of the price of the Air Force's sophisticated F-22). But when bought in quantity and combined with the cost of the V-22, their purchase would bring peak annual spending on the V-22 and JSF to about $5.7 billion —roughly four times the amount requested for Marine Corps combat aircraft in the Clinton Administration's fiscal year 2001 budget. (Technically, the V-22 and JSF are bought with Navy procurement funds.) If the Department of the Navy cannot increase funding for those aircraft, it may have to modernize either its fighter fleet, its airborne amphibious assault fleet, or both more slowly.

This option would halve the Marine Corps's annual procurement of V-22s during the 2006-2011 period, when both V-22s and JSFs would be bought. As a result, the service's average funding requirements during those years would decrease to about $5 billion. That sum may be more manageable than the Marine Corps's current plan and would save almost $3.5 billion in budget authority over 10 years.

Deferring purchases of V-22s would have drawbacks, however. The current amphibious assault fleet is made up of CH-46 and CH-53 helicopters that are more than 30 years old, on average. The CH-46s would remain in the fleet until their average age approached 50 if the V-22s deferred under this option were bought beginning in 2013, when planned V-22 purchases decrease sharply. (If the Marines had to engage in an extensive modification effort to retain the CH-46s or CH-53s longer, the savings from this option would be lower.) Also, the amphibious assault fleet provides more unique services than the Corps's fighter/attack fleet. The Marines can probably count on the Navy's carrier-based F/A-18 aircraft to provide them with additional firepower, but they cannot get aerial amphibious assault assets anywhere else. Also, cutting V-22 purchases might decrease the Corps's ability to perform peacekeeping missions and other smaller-scale contingency operations, which have grown more frequent in recent years. □

Option 050-30-B
Cancel Production of the V-22 Aircraft

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-1,259	-195
2003	-1,989	-680
2004	-1,756	-1,307
2005	-1,317	-1,614
2006	-898	-1,475
2002-2006	-7,218	-5,270
2002-2011	-9,550	-8,635

Instead of deferring procurement of the V-22 tiltrotor aircraft (as in the previous option), the Department of Defense could cancel the program altogether. If it did so, DoD might instead buy conventional helicopters for the Marine Corps. Several helicopters have been proposed as alternatives to the V-22:

- The CH-60, a variant of the Army's Blackhawk helicopter that the Navy chose instead of the V-22 to replace the aging CH-46s it uses in transport missions;
- The CH-53, which the Marines already use for heavy amphibious lift missions; or
- A military version of the S-92, a commercial transport helicopter developed by the Sikorsky Aircraft Corporation. Like the V-22, its capacity to carry troops and equipment falls between those of the CH-60 and the CH-53E.

This option would buy a mix of CH-53E and S-92 helicopters instead of the V-22, at a savings of about $1.3 billion in budget authority in 2002 and $9.6 billion over 10 years.

Critics of the V-22 have questioned whether the new aircraft will demonstrate enough improved capabilities to justify its higher cost. Some critics point to a November 2000 report by the Director of Operational Testing and Evaluation in the Office of the Secretary of Defense (OSD), which expressed concern about whether the V-22 will actually be able to land and take off quickly enough to have a higher survival rate than current helicopters.

The OSD report also raised concern about the V-22's low rate of availability (which results when planes break down frequently or take a long time to fix). If uncorrected, low availability could significantly reduce the cost-effectiveness of the V-22. According to the report, the V-22s that were tested were ready to perform their missions (mission capable) only 36 percent to 57 percent of the time, in contrast to the Marine Corps's desired rate of 82 percent. By comparison, the Army's Blackhawk had a mission-capable rate of about 80 percent, on average, over the past year, and even the aging CH-46 helicopter that the V-22 is intended to replace has a mission-capable rate of 79 percent. (Despite its concerns, the OSD report endorsed a continuation of flight testing for the V-22, although it recommended that testing be completed before the V-22 is deployed.)

Worries about the plane's safety could also prompt its cancellation. Four V-22s have crashed since the plane began flying, including two last year —one in April and one in December. Both of those planes were engaged in testing the V-22 in operational environments; the aircraft that crashed in December was performing what the Marine Corps described as standard night operations. An earlier version of the V-22 suffered a fatal mishap in 1992, and another plane was destroyed in 1991. (A tilt-rotor predecessor of the V-22 also crashed.)

Of the 14 V-22s that have been bought for developmental flight testing or allocated to operational flight testing, three (or 21 percent) have been lost. (The fourth was lost on a routine training flight, not as part of flight testing.) That percentage is much lower than the 50 percent loss rate experienced by the Marine Corps's CH-53 helicopter during its testing. It is only modestly higher than the 17 percent loss rate of the Blackhawk or the Army's early-model Apache attack helicopter during testing. However, none of the five prototypes of the S-92 or the five prototypes of the SH-60 (a seagoing variant of the Blackhawk) have crashed.

V-22s have also been grounded several times in the past year for safety reviews. They were grounded for two months following the April 2000 crash, for a shorter period in August (after a V-22 had to make a forced landing because of a safety-related problem), and again after the December crash.

If further flight problems or concerns about cost-effectiveness led to the cancellation of the V-22, some replacement would be needed for the Marine Corps's amphibious lift forces. This option assumes that DoD would buy a total of 360 S-92s for amphibious lift in place of an equal number of V-22s. (Only 215 of those S-92s would be bought through 2011, however—118 fewer than the number of V-22s that would have been bought by then. The slower acquisition occurs because modifying the S-92 for maritime missions and testing the plane are assumed to take several years.) The S-92 can transport almost as many troops as the V-22 (22 versus 24) and carry almost as much weight (external loads of up to 9,000 pounds instead of a maximum load of 10,000 pounds for the V-22).

In addition, buying 10 CH-53Es would add the capacity for another 360,000 pounds of equipment or 550 troops. Together with the S-92s, those CH-53Es would provide almost as much lift and troop carriage as 360 V-22s. However, other analyses of alternatives to the V-22 have called for purchasing more conventional helicopters to compensate for the slower delivery speeds and potentially reduced survivability associated with not having V-22s. Consequently, this option would buy a total of 80 CH-53Es from 2002 though 2011, at a rate of eight per year, to offset lost lift.

Critics of cancellation would argue that conventional helicopters cannot perform amphibious operations as quickly or safely as V-22s. The latter can fly faster and carry more equipment (or carry it longer distances) than helicopters can, so Marine forces with V-22s could build up combat power ashore—especially from long distances—more quickly than forces with helicopters. As a result, their amphibious assaults could prove less risky. There are other risks

associated with using helicopters: slower ones could present a target to ground-to-air missiles for longer periods, and some types, including perhaps the S-92, might have larger areas that are vulnerable to small-arms fire than the V-22 does.

In addition, unlike the V-22, the helicopters purchased in this option might not be able to self-deploy (fly from their base directly to a theater of operations rather than being partially disassembled and carried on a transport aircraft). They also lack other improvements that the Marine Corps hopes to achieve with the V-22, including systems that give pilots better information about potential threats.

Furthermore, conventional helicopters might not fly fast enough to fulfill some of the Air Force's stated requirements for its special-operations forces. Consequently, this option would not purchase any alternative to the V-22 for the Air Force's special-operations missions. (The Air Force expects to buy 50 V-22s by 2007 for those missions. If some other plane was bought instead, the savings from this option would be lower.) □

Option 050-31-A
Reduce Purchases of the Air Force's F-22 Fighter

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-360	-65
2003	-1,863	-487
2004	-1,799	-1,198
2005	-1,664	-1,559
2006	-1,774	-1,649
2002-2006	-7,460	-4,957
2002-2011	-25,312	-20,280

RELATED CBO PUBLICATION:

A Look at Tomorrow's Tactical Air Forces (Study), January 1997.

The F-22 is being developed as the Air Force's next premier fighter aircraft and is scheduled to begin replacing the F-15 soon. But the plane has experienced repeated delays, reductions in quantity, and increases in cost during the more than 20 years that the Department of Defense has discussed a replacement for the F-15. This option would decrease the planned purchase of F-22s by 219 planes. Assuming that the reduction was evenly distributed over the F-22's purchase period, it would save a total of $25.3 billion in budget authority through 2011.

The Air Force originally planned to buy more than 800 F-22s. After a series of cuts, the latest plan will buy only 339 aircraft—enough for about three air wings. Even if the Air Force makes no further cuts to planned purchases, it will have to pay $120 million apiece for the F-22. That price will purchase a number of improvements in capability over other fighters. Even so, the F-22's cost makes it the most expensive fighter ever built.

The F-22 is the only new tactical fighter program to survive from the Cold War period. (The other two fighters that DoD is planning—the Joint Strike Fighter and the Navy's F/A-18E/F—entered development after 1990. They are likely to be both less capable and less expensive than the F-22, although they may face many of the same threats.) The F-22's sophistication and cost, plus concerns about whether it will actually realize promised improvements in capability, have led some people to suggest that the F-22 is a legacy of the Cold War—a plane designed to fight many sophisticated Soviet fighters rather than the modest regional fighter forces it is more likely to encounter today. Such critics recommend canceling the program, or at least cutting planned procurement further.

In its report on its fiscal year 2000 defense appropriation bill, the defense subcommittee of the House Committee on Appropriations expressed concerns about the plane's cost and capability. The Senate concurred and the Congress directed DoD to complete testing of the F-22 before spending procurement funds on production. The Air Force argues that it has completed all of the testing ordered by the Congress, although it has not received approval from the Administration to enter the next phase of production.

The Air Force could reduce production quantities to a total of 120 F-22s, enough to let the service field one air wing of the sophisticated fighters. Such a "silver-bullet" purchase would allow the Air Force to learn lessons about producing aircraft of the F-22's technological complexity but might still leave more than enough planes to perform the missions for which the service needs the F-22's degree of stealth and other performance advantages.

One possible disadvantage of this option is that it would make the Air Force's fighter fleets, which are already aging under current plans, even older. However, buying 219 F-15s to replace the cut in F-22s would remedy that problem (see option 050-14). Although the F-15 is much less capable than the F-22, it is far more capable than the fighters of almost any of the United States' regional adversaries. A one-for-one offset of F-15s for F-22s would lower the 10-year savings from this option to $10.7 billion. □

Option 050-31-B
Cancel Production of the F-22 Fighter

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-4,056	-900
2003	-5,726	-2,833
2004	-5,282	-4,310
2005	-4,878	-4,828
2006	-4,674	-4,813
2002-2006	-24,616	-17,685
2002-2011	-44,985	-39,831

RELATED CBO PUBLICATION:

A Look at Tomorrow's Tactical Air Forces (Study), January 1997.

As the previous option discussed, the Air Force has great hopes for its new F-22 fighter, but the aircraft's development program has experienced numerous delays, reductions in quantity, and cost increases over the years. If the program does not deliver as promised—or if leaders in the Congress and the Department of Defense decide that the plane's capabilities are more expensive than they are worth—the F-22 could be canceled. Doing that without making any provisions for replacing the plane would save $4.1 billion in budget authority in 2002 and a total of $45 billion over 10 years. If F-22 purchases were offset with F-15s, savings would drop to $3.1 billion in 2002 and $24 billion over 10 years.

Outright cancellation would save more money than a "silver-bullet" purchase of F-22s (as described in option 050-31-A). But it would have several disadvantages. First, cancellation of the F-22 could affect development of the Joint Strike Fighter, since DoD expects the two planes to have common design elements. Second, the U.S. military might need the F-22's stealthy design and other characteristics if other countries improved their fighter capabilities. Third, if beginning another top-of-the-line fighter program to replace the F-22 proved necessary, some of the costs already incurred in developing the F-22 could be paid again in a new development program, adding to the government's overall costs. Finally, only part of the amount appropriated for the F-22 in 2001 might be recovered by the government, since some funds may already have been spent. □

Option 050-32
Slow the Schedule of the Joint Strike Fighter Program

The Joint Strike Fighter (JSF) program is one of the military's most ambitious aircraft development programs. Teams of contractors are competing to develop three versions of the aircraft: an inexpensive multirole fighter for the Air Force; a longer-range, stealthy, ground-attack plane for the Navy; and a short-takeoff/vertical-landing fighter for the Marine Corps. Together, those planes account for two-thirds of the fighter aircraft the military expects to buy

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-512	-300
2003	-610	-529
2004	-457	-499
2005	-197	-277
2006	-890	-163
2002-2006	-2,666	-1,768
2002-2011	-22,450	-16,168

RELATED CBO PUBLICATION:

A Look at Tomorrow's Tactical Air Forces (Study), January 1997.

through 2020 and roughly two-thirds of the spending on new tactical fighters, by CBO's estimate. Their costs are expected to total $225 billion in budget authority (in 2001 dollars).

This option would defer purchasing the first JSFs until 2008—three years later than the Department of Defense now plans. A slowdown in development and production would give the program more time to clear development hurdles and would decrease funding requirements by $2.7 billion over the next five years and $22.5 billion through 2011.

The JSF's development could prove very challenging. Variants of the aircraft are intended to perform significantly different missions, although the planes themselves are expected to have much in common. JSFs are also supposed to be more capable than the aircraft they replace but only slightly more expensive, if at all. Addressing those seemingly inconsistent goals at the same time could take longer than the program manager and contractors now envision.

In addition, the program's schedule is tight compared with that of the only other full-fledged development program for a fighter, the Air Force's F-22 air-superiority aircraft. The Joint Strike Fighter became a major defense acquisition program in May 1996; under the current schedule, the first formal review will take place in 2001, when the program is scheduled to enter the engineering and manufacturing stage of development (EMD). The JSF would then enter production in 2005, just four years after EMD began and nine years after the aircraft became a major acquisition program. The F-22 program, by contrast, has already been running for about 15 years and may take another year or more to enter low-rate production (see options 050-31-A and 050-31-B). The current JSF schedule is about 80 percent longer than that of the development program for another fighter, the Navy's F/A-18E/F, but that program needed only to modify an existing aircraft.

The JSF program has already had trouble keeping to its planned schedule and may encounter even greater delays in the future. Both of the contractor teams had expected to build and fly two prototypes before October 2000, but only one of those four aircraft had flown by then. As a result of that delay, the demonstration phase of the JSF program is behind schedule, although the program office has not yet released a revised schedule. Even longer delays might be associated with the next stage of development since it is much more challenging than the demonstration phase.

Slowing the schedule of the JSF program would let DoD better plan its future courses of action for tactical fighter fleets. For example, if DoD knew that it would have to wait longer to receive Joint Strike Fighters, it might choose to keep the production lines of current-generation aircraft open longer than it now plans. Also, successfully anticipating delays in the JSF program might improve DoD's ability to fashion plans for modifying current aircraft to make them last longer.

Opponents of slowing the schedule for JSFs could cite a number of concerns. Any up-front savings from lengthening the program, they might argue, would be offset by higher total costs. In addition, delays would mean that DoD's fighter fleets, which will already be much older, on average, than they were in the past, will grow even older before they are replaced. As a result, delays might mean that DoD would have to pay modification costs that it could otherwise avoid and would have fewer fighters available as they underwent age-related repairs. □

Option 050-33
Cancel the DD-21 Land-Attack Destroyer and Buy Smaller Ships

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-60	-40
2003	-290	-190
2004	-600	-300
2005	-2,260	-530
2006	-530	-260
2002-2006	-3,740	-1,320
2002-2011	-6,560	-5,370

RELATED CBO PUBLICATION:

Budgeting for Naval Forces: Structuring Tommorrow's Navy at Today's Funding Level (Study), October 2000.

The Navy is developing a new generation of destroyer, the DD-21 Zumwalt class. That ship is expected to carry hundreds of missiles and is being designed principally to attack targets on land, although it will be able to perform other missions, such as antisubmarine warfare. The Navy hopes to buy 32 of the ships at a total cost of $30 billion to $35 billion.

This option would cancel the DD-21 program and devote the entire savings to developing and buying 45 to 50 smaller warships more suited to coastal operations and the routine policing that the Navy usually performs. As a result of that reuse of savings, the option would have no net long-term impact on the Navy's budget. Between 2002 and 2011, however, the option would save a total of $6.6 billion in budget authority because it would delay acquisition of the first new ship by three years (compared with the schedule for the DD-21). Those savings would result even though this option assumes that developing the new warships would cost $1 billion more than developing the DD-21.

The DD-21 is intended to replace both the Oliver Perry class frigate and the Spruance class destroyer. The Navy plans to retire all of its frigates by 2018. Once that is done, it will not have a surface warship smaller than a destroyer. Thus, the Navy will have to either forgo some missions or use a larger warship to perform missions that were once done by smaller ships. Moreover, the DD-21 is a ship that appears to be designed for major wars. With a displacement of 12,000 tons, it will be larger than any other surface combatant in the Navy.

Supporters of canceling the DD-21 would argue that land attack is not the right focus for the Navy's new class of surface combatants. According to the Office of Naval Intelligence, the most likely maritime challenges that the United States and its allies will face include drug smuggling, violations of economic sanctions, illegal immigration, and arms trafficking. In addition to frigates, the Navy regularly uses cruisers and destroyers to help the Coast Guard and other agencies catch drug runners or thwart mass migrations. The use of those large, expensive warships for such policing duties will only become more pronounced as the Navy retires its smaller ships.

Similarly, the most likely military threats to U.S. naval forces in the foreseeable future include mines, inexpensive antiship cruise missiles, and diesel-electric submarines (see option 050-26). Although the Navy's larger warships are somewhat more capable than smaller ships of defending themselves against such threats, they also represent a much more attractive target. A smaller ship would not only be better suited to the policing duties described above but also represent a less costly target that could be used in operations that do not require a larger, more expensive vessel.

Canceling the DD-21 would have a number of disadvantages, however. First, the program is perhaps the most innovative that the Navy is now pursuing. The DD-21 is intended to have a completely new design; use a new, efficient power system; and operate with a relatively small crew. Other Navy development programs are expected to benefit from the research and innovation being pursued on the DD-21. Consequently, canceling that program now could disrupt the process of innovation in ship design for the Navy.

Second, until a new ship design was developed, canceling the DD-21 could have implications for the shipyards that build surface combatants. Unless a replacement class was ready to be ordered by 2005 (when the first DD-21 is scheduled to be ordered), canceling the new destroyer would mean either that the Navy would have to continue buying DDG-51s (Arleigh Burke class destroyers) at a low rate or that one of the shipyards might have to close. (Accordingly, this option would buy two more DDG-51s to help alleviate that problem.)

Third, fire support for the Marine Corps would suffer in the absence of the DD-21. The largest gun in the Navy's fleet today has a caliber of five inches. The DD-21 is supposed to have two 155-millimeter guns (slightly larger than a six-inch gun) to provide fire support for amphibious landings and Marine operations on shore. Among other advantages, 155mm guns will have a much longer range and be three times as powerful as the current five-inch guns. □

Supporting Military Forces: Personnel, Equipment, and Facilities

Although military capability depends on having the right size and configuration of forces with modern weapons, it also depends on how well those forces are supported. Do they have adequate numbers of experienced, trained personnel? Are the equipment and facilities they use in good condition? The options in the rest of this chapter focus on the personnel, equipment, and facilities that support the readiness of U.S. forces. They include options that would provide more funding for such resources as well as options that might allow DoD to meet its readiness goals at lower cost by changing the way it manages its resources.

Resources and Readiness

The readiness of U.S. forces to perform their missions is difficult to measure in peacetime. Consequently, efforts to assess readiness typically focus on inputs—the level of resources devoted to readiness—rather than on outputs. Traditional quantitative indicators of readiness compare units' resources (training, supplies, the condition of equipment, and the number, grade, and skill distribution of personnel) with standards based on wartime requirements. Other indicators of readiness examine the quality of recruits entering the force and the quality of the facilities in which service members live and work. Intangible factors, such as leadership and morale, also play an important role in readiness but are less easily quantified.

Developing objective assessments of readiness is difficult because of the large number of potentially divergent indicators, the potential for forces to be ready for one type of mission but not for another, and the subjective nature of some aspects of readiness. Uncertainty about levels of readiness and trends in those levels is particularly pronounced today. On the one hand, there is clear evidence that some important indicators of readiness—such as mission-capable rates for aircraft—have fallen below the levels seen in 1989, before the drawdown of U.S. forces began. On the other hand, funding for readiness, measured by spending on operation and maintenance per active-duty service member, is at a historic peak.

Reports of Readiness Problems. Although DoD leaders say the overall readiness of their forces has improved in recent months, each of the services continues to report problems with personnel, equipment, or both.[5] Observers who believe that current resources are inadequate given the size and frequency of U.S. deployments can point to a number of negative factors.

With the exception of the Marine Corps, each of the services reports ongoing readiness problems due to personnel issues. The Army reports shortages of captains and of enlisted personnel with critical skills. In addition, the Army's effort to fully staff its combat units has left its support structure, including its training facilities, undermanned; according to a recent report, 12 of the Army's 20 training centers are at the

5. Department of Defense, *Monthly Readiness Report to the Congress* (August 2000), p. 2.

lowest readiness level (C-4).[6] The Navy reports shortages of lieutenants and surface warfare officers. Its retention of enlisted personnel is also below desired levels. In the Air Force, shortfalls in the number of pilots and experienced maintenance personnel remain key issues.

The Marine Corps, Navy, and Air Force also continue to express concern about the condition of their equipment. The Air Force reports that mission-capable rates for its aircraft have declined by 10 percentage points (from 83 percent to 73 percent) since 1991. A report by the Navy Inspector General indicates that shortages of spare parts have limited the training of nondeployed carrier air wings and may have contributed to the poor performance of some aircraft in bombing runs in Serbia.[7] The Marine Corps reports that aging and corrosion have increased the use of parts and the time required for maintenance.

Interpreting Current Trends. Readiness has clearly declined in some areas. But in many cases, the implications for national security and defense budgets are unclear. DoD and the Congress may already have taken the actions necessary to fix existing readiness problems, or the reported problems may not threaten national security, or additional funding may not be the most appropriate solution.

Determining the policy implications of reported problems is complicated by the fact that some of those problems are spotty, affecting one service but not another. For example, in 1999, retention rates for Air Force enlisted personnel in their first and second terms of enlistment were at the lowest level in almost 20 years. But the Army experienced unusually high retention rates that year and continues to exceed its retention goals. Such a pattern makes it difficult to generalize about the adequacy of military compensation and quality-of-life programs.

Another complication is that people who favor more resources for readiness often overstate their case by measuring declines in readiness indicators from some high level that existed only under exceptional circumstances. For example, the Air Force reports its drop in mission-capable rates relative to the peaks achieved during and immediately after the Gulf War. Similarly, declines in the quality of recruits are often measured relative to the peaks achieved during the drawdown (when the services, having cut their demand for recruits more quickly than their resources for recruiting, substantially exceeded their quality goals). At what point do declines from peak levels threaten national security? How much readiness is enough?

In addition, some of the most widely publicized problems with readiness appear to stem—at least in part—from management problems rather than inadequate total budgets. For example, once the Navy recognized that the youth market had changed and that new approaches to recruiting were necessary, it was able to overcome many of the recruiting problems it experienced in 1998. Since then, the Army and Air Force also increased their focus on recruiting and, along with the Navy, met their recruiting goals for 2000.

An even more fundamental concern is that the traditional concept of readiness—which focuses on whether units have the resources and training they need to perform in major theater wars—may no longer adequately define readiness. Today, national security depends to a significant degree on the ability of units to undertake and accomplish new tasks quickly. For example, the commanders of two Army divisions with units engaged in the Balkans reported in 1999 that their divisions were not ready (they had a rating of C-4). That assessment was accurate in the sense that, given the absence of the deployed units, those divisions could not deploy quickly to a major theater war and perform their primary mission as they were designed to. Yet the fact that some units from those divisions went to the Balkans—where they received not merely training but actual experience in peacekeeping—could contribute to the divisions' ability to respond to future contingencies.

Various Approaches to Readiness Issues. Although evidence of readiness problems could be a sign that the military needs to spend more on such things as compensation and quality-of-life initiatives,

6. Rowan Scarborough, "Army Training Centers Get Failing Grade," *Washington Times*, August 29, 2000, p. 1.

7. Associated Press, "Navy Aviation Is in Bad Shape, Service's Inspector General Says," *New York Times*, September 9, 2000, p. A-11.

maintenance of real property and equipment, and inventories of spare parts, budget increases may not be the best solution for every readiness problem. In some cases, changes in Cold War programs or in management and budgeting practices—an approach proposed by the 1996 Defense Science Board study of DoD infrastructure—may be necessary if high levels of readiness are not to prove prohibitively expensive. In other cases, additional funding or management changes are already working their way through the system, or the readiness problem, although real, is a risk that DoD might choose to accept. Despite the department's stated commitment to readiness, many observers argue that it needs to strike a different balance between current readiness and the modernization and force-structure initiatives that are increasingly referred to as "future readiness."

The options below take varying approaches to improving readiness. Some would add resources without changing management practices. They would involve the fewest risks and offer the greatest prospect for immediate increases in readiness. Other options would change traditional management practices—for example, by moving away from a pay system that differentiates between personnel on the basis of marital status; reducing DoD's direct role in providing housing, health care, and retail services; or consolidating maintenance depots. Whether or not those changes were accompanied by additional funding, they could increase the risks to readiness in the short run. But in the long run, they might lower the cost of maintaining readiness and free up resources for modernization.

The Military Compensation Package

In response to concerns of the Joint Chiefs of Staff, the 106th Congress passed increases in all major aspects of the military compensation package—cash compensation (including basic pay, bonuses, and retirement pay), health care, and other noncash benefits (such as housing and child care). A military compensation package that can attract and retain high-quality, versatile personnel, who are able to learn new tasks and adapt to new practices quickly, might be especially important today—when the major threat to national security is diffuse and uncertain and when deployments can involve a wide range of tasks that are not the focus of standard training.

In addition to cash and noncash benefits, another tool that DoD might use to attract and retain personnel is working conditions. Those conditions include such diverse elements as the frequency of deployments, the condition of facilities and equipment, the quality of military leadership, and opportunities for meaningful, patriotic service. Although such conditions are often determined by operational needs and are not normally considered part of the overall compensation package, failure to provide satisfying working conditions can reduce retention rates. Many of the options at the end of this chapter that address the condition of facilities and equipment—as well as some previous options, such as the one that would increase staffing in military units—are aimed in part at changing the working conditions of service members.

Cash Compensation

Among its other military compensation initiatives, the 106th Congress raised retirement benefits for service members who entered the force after 1986, provided for consecutive annual across-the-board pay raises that are 0.5 percentage points above the growth rate of civilian wages, and restructured the military pay table using targeted pay raises to increase the importance of promotions rather than time in service.

Those actions are expected to boost retention in the military as a whole. But whether they will resolve the services' specific retention problems—which are focused on particular ranks and skills—is unclear. Moreover, the gains in overall retention will be expensive. One reason for the high cost of those changes—and their questionable impact on DoD's most serious personnel shortages—is that the pay raises are not targeted toward those shortages. Pay raises that exceed the growth in civilian wages are being given not only to people in occupations where DoD has shortages but also to people in occupations where DoD has excess personnel. Another reason is that the effect of higher retirement benefits may be limited by the fact that service members, like others in U.S. society, place a much higher value on current income than future income. Thus, past research indicates that increases in retirement pay are likely to be

a less cost-effective way to boost recruiting and retention than additional pay raises would be.

Frequent changes in any retirement system can disrupt expectations, so further modifications to the military retirement system may not be appropriate now. But increases in basic pay are typically determined by DoD and the Congress each year. The options below examine possible policies for setting future pay raises, the potential for using special pay targeted toward personnel whose skills are in short supply, and the role of the unemployment compensation program in rewarding separation from active duty. An additional option would eliminate the difference between pay for married and single personnel; it illustrates how some analysts believe the military compensation system might be fundamentally restructured to make it more cost-effective.

Option 050-34
Modify Planned Pay Raises for Military Personnel

In 1999, the Congress established temporary procedures designed to increase basic pay in the military at a greater rate than pay in the private sector. Those procedures set the annual military pay raise between 2001 and 2006 at 0.5 percentage points above the increase in the employment cost index (ECI) for wages and salaries of private-sector workers. According to widely published reports, a "pay gap" of more than 13 percent separates military personnel from workers in the civilian sector. In advocating the new pay procedures, the Senate Armed Services Committee cited the need to "close the gap between military pay and private sector wages." The House Armed Services Committee called for smaller raises (equal to the increase in the ECI), referring only to the services' recent negative trends in retaining personnel. The temporary procedures enacted in 1999, combined with the raises authorized for 2000 and 2001, will increase basic pay by about 3.3 percent (with compounding) above the change in the ECI from 1999 to 2006.

This option would change the procedures that the Congress established, providing for either larger annual increases or smaller ones. The alternative of larger raises would increase basic pay by 2.4 percentage points more than the change in the ECI each year from 2002 through 2006, thus eliminating the reported pay gap. That change would add $844 million to defense outlays in 2002 and a total of $58.3 billion through 2011. (Total federal costs for the option, however, would be $14.1 billion lower than that over 10 years because the Department of Defense's payments for military retirement and some other personnel programs are intragovernmental transfers and thus appear as receipts elsewhere in the budget.)

The second alternative would follow the example of the House Armed Services Committee, limiting raises to the annual increase in the ECI without an additional 0.5 percentage points and leaving pay about 2.5 percent lower in 2006 and beyond than un-

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
Larger Pay Raises		
2002	877	844
2003	2,149	2,101
2004	3,561	3,508
2005	5,124	5,065
2006	6,829	6,764
2002-2006	18,540	18,281
2002-2011	58,584	58,258
Smaller Pay Raises		
2002	-231	-222
2003	-560	-548
2004	-918	-904
2005	-1,306	-1,291
2006	-1,721	-1,705
2002-2006	-4,735	-4,670
2002-2011	-14,800	-14,718

RELATED CBO PUBLICATION:

What Does the Military "Pay Gap" Mean? (Paper), June 1999.

der the temporary procedures. That alternative would save $222 million in 2002 and $14.7 billion through 2011. (Total federal savings over 10 years would be $3.6 billion less.)

Various policymakers and analysts disagree about the need to increase military pay relative to pay in the civilian sector. That disagreement centers on two issues: the meaning of the reported pay gap and the severity of current problems in recruiting and retaining military personnel.

The common approach to comparing increases in military and civilian pay has several shortcomings, according to studies by RAND (a federally funded research center) and the Congressional Budget Office. A 1999 paper by CBO noted that the 13 percent gap reported in the press measures changes in relative pay between the two sectors rather than absolute levels of pay, takes no account of the age and education level of workers, and uses an essentially arbitrary starting point, 1982. CBO's analysis indicated that among all groups of military personnel, on average, pay increases since 1982 have roughly matched those among comparable workers in the civilian economy. Moreover, the level of pay for military personnel, whether officer or enlisted, falls at about the 75th percentile of pay rates for workers in the civilian sector of the same age and education.

Notwithstanding such analyses, some proponents of higher military pay continue to argue that military personnel are paid less than they could earn in civilian jobs. The Chairman of the Joint Chiefs of Staff stated in 1998 that "You can argue about how big the pay gap is . . . but nobody [in the Pentagon] denies there's a gap." Some Members of Congress reportedly favored a plan to "close the pay gap" over three years through raises several percentage points higher than the average increase in private-sector pay. Thus, regardless of what the true situation may be, belief in the existence of a large pay gap remains a powerful force in discussions about the best course for military pay policy.

Advocates of smaller pay raises would probably take strong issue with the assertion that a pay gap exists or even matters. First, they would point out, no one has demonstrated a gap as proponents of higher pay think of it—a difference between civilian and military pay scales. Second, they would say, the pay of military personnel overall has not fallen relative to the pay of civilian workers of the same age and education level. In addition, they could argue, the notion of a pay gap—a measured difference between levels of pay in the military and civilian sectors—is not relevant to decisions about military pay. Depending on how service members and potential recruits view the advantages and disadvantages of military service, the armed forces might have to pay considerably more than civilian employers, or conceivably less, to attract and retain enough qualified personnel.

A second issue of contention is the services' recent ability to meet their personnel needs. The Air Force reported unusually heavy losses of experienced personnel in recent years, perhaps because of the large number of smaller-scale deployments during the 1990s. Such deployments affect both the personnel sent overseas and those who stay behind (see option 050-10). In addition, reenlistment rates among Air Force personnel completing their first and second enlistment terms have fallen recently. Moreover, every service but the Marine Corps had trouble meeting its recruiting objective in 1999, although new enlistment programs and additional recruiting resources helped all of them meet their goals in 2000. Advocates of larger pay raises would argue that increased pay could mitigate retention and recruiting problems that might otherwise become more severe.

Proponents of smaller pay raises might argue that retention problems are not widespread and that if recruiting difficulties persist, they are better addressed through less expensive policies than an across-the-board pay raise. The Army has been as stressed by deployments as the Air Force, those proponents might argue, yet the Army was able to reduce its planned accessions of recruits in 1999 because it retained more enlisted personnel than it had expected. The Air Force's problems, they might say, should be solved by the greater predictability of deployments under the service's new Expeditionary Aerospace Force concept or dealt with by expanding reenlistment bonuses (see the next option). Finally, proponents of smaller raises could argue that increasing pay is an expensive way to solve recruiting problems; less expensive alternatives include increasing the number of recruiters, spending more on advertis-

ing, and offering more generous education benefits or enlistment bonuses.

Opponents of both alternatives in this option—people who would prefer the status quo of planned pay raises slightly exceeding average increases in private-sector pay—might offer two arguments for their position. Some would say that if the reported pay gap or retention problems warrant raising military pay, slow change is the best approach. Better to see the effects of the planned raises and improvement in retirement benefits, they would argue, than to commit immediately to a large pay increase. Others would contend that even if retention problems are not serious or the reported pay gap does not exist, the planned increases are necessary because service members believe the reports that they are underpaid and their perceptions will determine their actions. According to advocates of the status quo, when the service chiefs supported members' belief that they were underpaid and the Congress set out to increase military pay, a course was set that could not be reversed without serious consequences. □

Option 050-35
Increase Reliance on Selective Reenlistment Bonuses

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	60	57
2003	74	74
2004	88	88
2005	102	101
2006	109	108
2002-2006	433	428
2002-2011	1,013	1,007

Selective reenlistment bonuses (SRBs) are monetary incentives used to encourage the reenlistment of qualified service members in occupational specialties with high training costs or demonstrated shortfalls in retention. Eligible personnel generally receive half of their bonus when they reenlist and the remainder in annual anniversary payments over the course of their additional obligated service. Each service regularly adjusts its SRBs to address current retention problems, adding or dropping eligible specialties and raising or lowering bonus levels. Despite their use of reenlistment bonuses and other incentives, however, each of the services has at times had difficulty meeting its need for career personnel, particularly in some occupations.

This option would increase the services' spending on initial bonus payments to $400 million annually and remove current restrictions on the maximum bonus amount that an individual can receive. That additional spending would represent an increase of about one-quarter over funding for new bonuses in 2000 and 2001 and a nearly threefold increase compared with 1998. (The services began increasing their spending on bonuses in 1999, and the Congress added about $80 million to their requested amounts for each of the next two years amid concerns about poor retention.) Total spending on initial and anniversary SRB payments under this option would rise from roughly $340 million and $531 million in 1999 and 2001, respectively, to more than $770 million in 2007 and beyond. That increase reflects both the cost of this option—$57 million in outlays in 2002 and $1 billion over 10 years—and the long-run cost of the earlier growth in initial payments.

Although this option would have a substantial direct effect on defense costs, the actual increase in personnel costs could be much smaller, or even negative. Increased spending on reenlistment bonuses should improve retention, allowing policymakers to slow the growth of basic pay or other elements of military compensation (see the previous option). The estimated costs of this option do not reflect those offsetting savings, however, because the extent of the savings would depend on what actions, if any, policymakers took.

The four services use SRBs to differing extents. In late 1999, for example, almost half of the Navy personnel completing their initial enlistment term who were eligible for a bonus could receive one equal to a year's basic pay or more if they reenlisted

for four years. In the Army, by contrast, only about 15 percent of equivalent personnel could receive a bonus equal to more than four months of pay for a four-year reenlistment. Large bonuses were less prevalent in the Air Force and the Marine Corps than in the Navy, but far more common than in the Army.

Advocates of expanding the SRB program might argue that current bonus levels are too small to provide meaningful differences in pay among occupations. One year's basic pay for a four-year reenlistment—the largest bonus that the Army offers to any significant degree—actually amounts to only about a 13 percent addition to total pay over four years after accounting for the other elements of cash compensation and for pay raises over those four years (which do not affect the bonus). The largest bonuses add somewhat more than one-third to recipients' pay, but only the Navy offers bonuses at that level and only for a few occupations that involve operating and maintaining nuclear power plants on ships and submarines. In the civilian sector, by contrast, differences in average pay of one-third or more are common, even among blue-collar occupations.

Proponents of this option would argue that larger pay differences among occupations would be a cost-effective tool for improving military readiness. Compared with across-the-board increases in pay or benefits, bonuses are more efficient because they can reduce shortages of experienced personnel in those occupations most critical for readiness without contributing to surpluses in other occupations. Bonuses can also be focused on the years of service in which personnel make career decisions. (Pay raises can be focused on certain grades or years of service, but policymakers have rarely been willing to do so.) And compared with pay increases, bonuses avoid the heavy cost of "tag-alongs"—the elements of compensation, such as retirement benefits, that are tied to levels of basic pay.

Some critics of expanding reenlistment bonuses would argue that large pay differences among occupations violate a longstanding principle of military compensation: that personnel with similar levels of responsibility should receive similar pay. In their view, reenlistment bonuses should be limited to a few critical specialties with severe shortages. Other critics of bonuses and other special and incentive pays would turn the "tag-along" argument of proponents on its head. Increasing reenlistment bonuses, those critics would say, unfairly deprives service members of the retirement and other benefits that they would receive if that money were instead made part of basic pay throughout their career.

Other opponents of this option might agree that the military should offer large pay differences among occupations but criticize the origin or timing of the expansion in bonuses. They would argue that decisions about reenlistment bonuses should be left to the individual services, who are better able than outsiders to compare the cost of added bonuses with the cost of alternatives for addressing shortages of experienced personnel, such as recruiting and training new personnel. Those critics might also point out that the Congress has improved retirement benefits for many personnel and committed itself to increasing military pay at a rate greater than the increase in private-sector pay. Thus, they would argue, bonuses are not an alternative to across-the-board increases but an addition to them, and the results of those increases should be seen before the Congress considers expanding other incentives. □

Option 050-36
Eliminate Differences in Pay Between Single and Married Service Members

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	72	67
2003	534	502
2004	997	961
2005	1,409	1,374
2006	1,919	1,876
2002-2006	4,931	4,781
2002-2011	52,517	51,588

NOTE: These numbers do not include additional tax receipts.

The military generally pays married personnel more than single personnel performing the same job. The difference derives from the military's unique system of either providing food and housing to its members directly or paying them cash allowances to cover food and housing costs. Married personnel are generally thought to need more housing than single personnel, so both DoD-provided housing and housing allowances are larger for service members with dependents than for those without dependents. In addition, most single personnel in the junior enlisted pay grades (E-5 and below) are expected to eat in government dining facilities and live in DoD housing; they may provide their own meals and rent an apartment if they choose, but without specific authorization they cannot receive cash allowances to help cover the cost.

This option would eliminate the pay differences between married and single personnel by dropping the separate allowances for food and housing—in other words, moving to a salary system. Over a five-year transition period beginning in 2002, housing allowances for single personnel would gradually rise to the married level. In 2007, the food allowance and all but the locality-specific component of the housing allowance would be rolled into basic pay. (The locality-specific component would be combined with an existing allowance that accounts for differences in nonhousing costs.) An additional amount would be added to basic pay to compensate members for the increased liabilities they would incur for Social Security and federal income taxes when the nontaxable allowances were converted to taxable pay. Also in 2007, computation procedures for retirement pay and other elements of compensation that are linked to basic pay would be revised to prevent any increase in their costs.

Making those changes would add $67 million to defense outlays in 2002 and a total of $51.6 billion through 2011—or about 9 percent to military personnel costs once the transition was completed in 2007. (Total federal costs, however, would be $8.9 billion lower than that over 10 years because DoD's payments for military retirement and some other personnel programs are intragovernmental transfers and thus appear as receipts elsewhere in the budget.) Increased tax receipts would offset about $20.9 billion of the costs in the 2007-2011 period.

Since long before the modern volunteer military began in 1973, outside studies and government-sponsored commissions have recommended adopting a salary system for the military. A common argument is that paying two people with the same rank and job at different rates simply because one is married and the other unmarried is inequitable. The pay difference also creates an incentive for service members to marry, which raises the military's costs for dependents' health care and other benefits. In addition, proponents note that eliminating the separate food and housing allowances would make total military compensation more visible and thus more effective. It would also increase the visibility of another portion of defense costs: the tax revenues that are forgone because the current allowances are tax-free. Another advantage of this option is that most of the cost reflects a pay increase for single personnel, which could improve their retention.

Some critics might argue that this option would represent an ill-advised meddling with a pay system that has served the military well for over 50 years. But the most recent DoD study of moving to a salary system focused instead on the practical difficulties of making the transition. For example, devising payment schemes for the elements of compensation now tied to basic pay could prove difficult, in part because converting the allowances into basic pay would raise the basic pay of some groups of personnel more than that of others. Most of the difficulties, however, would derive from the current tax-free nature of the allowances. Calculating the increase in federal tax liabilities for a typical service member in each pay grade would be straightforward, but some personnel would wind up better off than before the transition and others worse off. In addition, Congressional budget rules could make it difficult to recognize the increase in tax receipts that would occur when the allowances were converted into taxable pay as an offset to the costs of this option. Finally, the cost estimate for this option assumes that service members would not be compensated for their additional liabilities for state and local taxes because those would depend on where members chose to establish residency; critics could point out that ignoring state and local taxes would effectively cut the pay of military personnel.

Another question that would arise in the transition to a salary system would be how to set rents for government housing for both single and married personnel once the current practice of charging an implicit rent equal to the service member's housing allowance was no longer practical. The cost estimate for this option assumes that rents would be based on the housing allowances at the end of the transition period, adjusted annually for changes in local housing costs. Rents for family housing would be equal to the full allowance. For bachelor housing, a "dorm fee" would gradually decline from the full allowance at the beginning of the transition period to half the allowance at the end. The estimate assumes that the services would continue their current policy of expecting most single personnel in grade E-5 or below to live in barracks or aboard ship; for such personnel, the dorm fee would be mandatory.

An alternative plan for family housing that might be appropriate after the transition would be to raise rents to levels sufficient to eliminate waiting lists for the available government housing. That alternative is examined in option 050-44. □

Option 050-37
Deny Unemployment Compensation to Service Members Who Leave Voluntarily

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-126	-126
2003	-135	-135
2004	-145	-145
2005	-155	-155
2006	-166	-166
2002-2006	-728	-728
2002-2011	-1,702	-1,702

Many military personnel who voluntarily leave active-duty service are eligible for unemployment benefits. That situation contrasts with the situation of civilians in the public and private sectors, who must lose their job to qualify for unemployment compensation.

This option would subject former military personnel to the same rules as members of the civilian labor force; in other words, only personnel who were terminated from military service involuntarily would be eligible to receive unemployment benefits. That change would reduce the number of departing personnel eligible for benefits by at least two-thirds and save $126 million in 2002 and $1.7 billion through 2011. (Because the Department of Defense ultimately reimburses the Department of Labor for the cost of unemployment payments to former service members, most of those savings would come out of DoD's budget. A small portion of the savings, $52 million through 2011, would come out of the Department of Labor's budget. Those latter savings would represent savings in mandatory spending.)

Most personnel who leave military service do so voluntarily. Many choose not to reenlist after completing a term of service; others, who have served for a minimum of 20 years, opt for voluntary retirement. A much smaller group is separated involuntarily for reasons related to job performance or failure to achieve a promotion.

Proponents of this option would argue that subjecting military personnel to the same rules as the rest of the workforce would make more equitable use of an entitlement program that was intended to aid people who lose their job involuntarily.

Critics, by contrast, might argue that the frequent moves associated with military service mean that members who separate voluntarily are unlikely to take up residence in the area of their final posting, making it difficult for them to find a new job before they leave the service. In those critics' view, voluntary separation from military service is not comparable with voluntary termination of civilian employment and therefore should not be subject to the same restrictions on eligibility for unemployment compensation.

Moreover, the current treatment of military personnel in the unemployment compensation program is well established. Although in 1981 the Congress briefly eliminated eligibility for service members who leave voluntarily, it restored that eligibility the following year. □

Health Care Benefits

Health care, which will cost DoD about $17 billion in 2001, is arguably the most important noncash element in the military's overall compensation package. A service member's degree of satisfaction with the military health care system can play an important role in his or her decision to remain in the service. That system was the focus of much Congressional attention during 2000. The resulting legislation made significant changes: eliminating all cost sharing for health services provided to the families of active-duty service members who are enrolled in the military health plan known as Tricare Prime; setting standards that are intended to give active-duty families who live in remote areas the same access to care as those who live near larger bases; and, beginning in April 2001, greatly expanding health benefits for military retirees and their dependents who are 65 or older. Although those changes address some longstanding concerns about the military health care system, important problems remain. This section examines other possible changes.

The Structure of the Military Health Care System. The fundamental reason for the military to have its own health care system is to keep service members ready for duty and provide them with care during military operations. During the Cold War, the military medical system was structured to fit scenarios involving mass casualties in a major European war. In peacetime, that structure would be available to provide large amounts of care to beneficiaries not on active duty, including the families of active-duty personnel, retirees, surviving military spouses, and their dependents. More recent planning scenarios require less medical capacity; as a result, DoD has substantially reduced its system of military treatment facilities. Yet even with those reductions, the system is much larger than required for current wartime scenarios. Most of DoD's health care budget is devoted to caring for non-active-duty beneficiaries. Of the 8.2 million people eligible to use the system, only about one in five is a service member on active duty.

Active-duty personnel receive free health care through DoD's hospitals and clinics (called the direct care system) and a closely affiliated network of civilian providers. Family members and other beneficiaries who are not on active duty (and are not yet eligible for Medicare) have two health care options. One is to enroll in Tricare Prime and agree to seek treatment through the same direct care system and network of civilian providers that serve active-duty personnel. Patients who use Tricare Prime face low (usually no) fees and copayments for comprehensive care in exchange for the limited flexibility of a managed care approach. The second option is to use Tricare Standard or Extra—insurance plans that allow military beneficiaries to seek care from a larger number of civilian providers. Those plans feature benefits, copayments, and deductibles similar to the ones in private-sector fee-for-service plans and preferred provider plans, respectively. Beneficiaries who choose Tricare Standard or Extra can also receive care at very little cost from DoD's direct care system. But unlike people enrolled in Tricare Prime, they can do so only when space is available.

Under previous law, military retirees and dependents lost their eligibility to use DoD's health insurance plans when they turned 65 and became eligible for Medicare. However, they could still receive free care at military hospitals and clinics when space was available, and they could fill prescriptions and get laboratory services at those facilities free of charge. In recent years, however, base closures limited DoD's ability to provide elderly beneficiaries with space-available care in certain areas, and some retirees claimed that DoD had reneged on a promise to provide them with free lifetime medical care.

Legislative changes enacted last year directly responded to that criticism. The Floyd D. Spence National Defense Authorization Act for 2001 greatly expanded health benefits for older military retirees and their families. Beginning this April, all military beneficiaries age 65 or older will be eligible to use DoD's mail-order pharmacy program and network of retail pharmacies. Starting in 2002, military beneficiaries enrolled in Part B of Medicare may begin to use Tricare Standard or Extra as "wraparound" cover-

age to supplement Medicare (those plans offer certain benefits that Medicare does not). The Congress directed DoD to refrain from charging elderly beneficiaries coinsurance or deductibles for their use of services under those new benefits. Beginning in 2003, responsibility for paying the health expenses of those military beneficiaries will shift from DoD's appropriation to a trust fund. Although DoD will begin making accrual payments into that fund for the future health costs of active-duty service members and their dependents, obligations for the health expenses of elderly beneficiaries who are already retired will largely be paid for by the general fund of the U.S. Treasury.

Criticisms of Military Health Care. Two interrelated criticisms are often directed at DoD's health care system. First, some Tricare users complain of long waits for appointments at military hospitals and clinics or difficulty getting access to the limited number of specialists available through Tricare's networks of preferred providers. Some Tricare beneficiaries have also found it hard to get care when they are away from home.

To some extent, those concerns about access may reflect growing pains in the Tricare system, which DoD started in 1995 but only gradually expanded nationwide. Under Tricare, DoD relies on private contractors in different regions of the country to provide advice lines staffed by nurses, schedule appointments with military and civilian providers, set up networks of providers, negotiate payment rates, and process claims for reimbursement. Many of the complaints about Tricare focus on the service that those contractors provide. However, enrollees' satisfaction with Tricare has generally improved as the contractors and DoD have gained experience with the system and with coordinating benefits in different parts of the country.

Nevertheless, some of the reported problems with access to care under Tricare may reflect more fundamental problems. Long delays for patients seeking treatment in military facilities may indicate a lack of focus on customers' needs, inefficiency in the use of doctors' time, or the crowding out of Tricare Prime enrollees by beneficiaries who are technically eligible to receive care only when space is available. Moreover, the behavior of patients is such that a medical system that does not use copayments to control usage may have to rely instead on implicit costs in the form of waiting time. In the absence of copayments, increasing the capacity of the system could lead to an increase in the number of patients, with no significant change in the average waiting time for a visit.

A second criticism is that DoD's medical system has trouble planning for and controlling health care costs. Civilian health care plans must also plan for and control costs, but the structure of military health care benefits makes those tasks particularly difficult for DoD. Planning is complicated by the fact that beneficiaries who choose not to enroll in Tricare Prime can still turn to space-available care at military facilities or to Tricare Standard or Extra at any time that coverage is convenient for them. As a result, the amount of medical care they will seek from DoD in any given year is uncertain.

Cost control is further complicated by the fact that care at military hospitals and clinics is free (or nearly free) to its recipients. The system's incentive structure causes beneficiaries to use substantially more care than other U.S. residents—even though more care does not necessarily lead to better health. In addition, as private-sector employers and insurers have required beneficiaries to pay more of the cost of their care, people who are also eligible for DoD's system have increased their reliance on military facilities for services (such as pharmacy services) that would otherwise entail out-of-pocket costs.

The experience of private-sector health plans suggests that charging a nominal copayment for routine outpatient visits and pharmacy services gives consumers an incentive to use care more prudently without significantly affecting their health. DoD, however, has characterized copayments for treatment in military facilities as cost-cutting measures that would harm the quality of life of service members. Recent legislation eliminated copayments for active-duty family members enrolled in Tricare Prime who are treated by civilian providers. Nevertheless, beginning to charge copayments at both military and civilian facilities could be seen as a way of making DoD's efforts to improve access to health care more cost-effective.

In the future, DoD may have trouble restraining the growth of costs for its new benefits for older military retirees and their dependents. After 2003, those costs will be paid with mandatory spending rather than a fixed level of funding allocated each year through Congressional appropriations. (As a result, mandatory spending will rise by a total of nearly $60 billion through 2010, CBO estimates.) Moreover, DoD plans to administer the new Tricare Standard or Extra wraparound coverage without charging elderly beneficiaries any enrollment fees, deductibles, or coinsurance for their use of services.

The options presented below represent a mix of approaches to the challenges faced by the military health care system. Some of the options would try to provide better benefits by adding resources to the system; others would institute copayments to make the system more efficient; and others would fundamentally restructure DoD's role in providing health care in the post-Cold War era.

Option 050-38
Increase the Capacity to Serve Active-Duty Families at Military Treatment Facilities

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	150	108
2003	365	223
2004	384	308
2005	392	355
2006	401	380
2002-2006	1,692	1,374
2002-2011	3,835	3,411

Most families of active-duty personnel enroll in Tricare Prime, a health plan that promises comprehensive care at minimal cost. But many of those families complain that obtaining appointments to receive care at military hospitals and clinics—where Tricare Prime is centered—is difficult.

This option would try to improve access for active-duty personnel and their families at military treatment facilities through three approaches. It would expand the Department of Defense's capacity to offer outpatient services at those facilities by hiring more civilian staff to support military health care providers. It would also increase the number of exam rooms available for outpatient visits at those facilities. And it would change the incentives of physicians who supply care at military hospitals and clinics. Together, those measures would cost $1.4 billion in outlays through 2006, or a total of more than $3.4 billion over 10 years.

Some DoD planners say the military health care system is greatly in need of support staff, such as registered nurses and other skilled personnel who provide technical assistance and follow-up care. Since 1990, DoD has cut the number of civilian workers in its system by 22 percent, while the number of military medical personnel has fallen by 13 percent. According to DoD analyses, military outpatient clinics have a lower ratio of support staff to health care providers (including physicians, physical therapists, and psychologists) than many health maintenance organizations (HMOs) in the private sector.

In a 1998 hearing before the House National Security Committee, the Surgeons General of the Army and Navy both identified support staff as a high-priority need within the military health system, since those personnel can free up physicians' time to see more patients. For its part, the Office of the Secretary of Defense has set a goal of having 3.5 support personnel per provider throughout its clinics, based on what it believes are norms among HMOs. This option would give DoD new funding to achieve that ratio of support staff to providers of outpatient care.

Besides staffing, military facilities also differ from the private sector in their physical capacity for outpatient care. Most DoD hospitals were built decades ago and were designed to focus on inpatient care rather than outpatient visits. Many civilian HMOs, by contrast, do not operate their own inpatient facilities at all. This option would provide new funding to build more rooms for outpatient exams at military facilities.

Although those measures would expand DoD's capacity for outpatient visits at on-base facilities, they might not be sufficient to improve active-duty families' access to care. For example, physicians could resist moves to add to their current workload of patients. This option would try to counter that possibility through monetary incentives for military physicians. Specifically, providers who serve as primary care managers would be eligible to receive up to $22,000 per year in bonus compensation that would be tied to the productivity of a group of military physicians, as measured by quality of care and patients' satisfaction and access. Bonuses would be divided among groups of physicians rather than awarded to individuals for two reasons: to use peer pressure to ensure that providers offered high-quality care, and to avoid the need to adjust measures of an individual physician's productivity for the relative complexity of his or her cases.

Supporters of this option would argue that expanding outpatient capacity and changing the incentives of providers could make the military health care system more accessible. Those changes could reduce waiting times and make it easier to schedule appointments at military hospitals and clinics. In addition, if health care is a key consideration in service members' decisions about whether to leave or stay in the military, such measures might help increase retention.

Opponents of expanding the number of support staff at military clinics might argue that DoD should have a lower ratio than is common in the private sector. DoD's health care providers must furnish more on-the-job training than civilian providers do, since active-duty support personnel often have not had much instruction in health care before entering military service. Moreover, critics of this option would contend that before DoD devotes more funds to hiring support staff or building exam rooms, it should first look at how it can better manage its current resources. Some might argue that DoD has too many physicians on active duty.

Other critics of this option contend that increasing the capacity of the system could do little to reduce delays in appointments because, in the absence of copayments, the additional capacity might simply induce beneficiaries to seek more care. (Such delays might be reduced, however, if DoD also began charging nominal copayments for outpatient visits; see option 050-40.) Moreover, if tied solely to volume of patients, the performance bonuses for physicians could create an incentive for them to provide unnecessary or poorer-quality care. □

Option 050-39
Downsize the Military Medical System

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	1,429	1,567
2003	361	629
2004	1,179	1,683
2005	689	1,315
2006	-1,408	-863
2002-2006	2,250	4,331
2002-2011	-16,031	-12,376

RELATED CBO PUBLICATION:

Restructuring Military Medical Care (Paper), July 1995.

This option would substantially reduce the size of the Department of Defense's direct care system, cutting the number of beds in military facilities to the amount that DoD would need to care for two-thirds of the casualties it anticipates from two nearly simultaneous major wars. As part of that downsizing, DoD would convert many military hospitals into outpatient clinics, close other facilities, and reduce the number of active-duty physicians. This option would also discontinue the Tricare program for retirees and all types of dependents, requiring them to seek care in the civilian sector. Instead, they would be offered coverage through the Federal Employees Health Benefits (FEHB) program.

Such restructuring of the military medical system would require additional spending in the near term but would offer substantial savings later on. Net

savings in outlays would total more than $12 billion through 2011. That estimate reflects savings from operating a smaller military system (assuming that DoD faces the same upward pressures on the cost of care that private-sector providers and insurers do). It also takes into account the costs of closing facilities and of providing FEHB coverage to non-active-duty beneficiaries. Under this option, DoD would pay the same share of the premiums for FEHB health plans that other federal agencies do for their civilian employees. In addition, families of active-duty service members who enrolled in FEHB would receive a voucher that covered much or all of the remaining share of their premium.

Supporters of downsizing note that although DoD's wartime medical requirements during the Cold War were based on the scenario of a large conventional conflict in Europe, more recent planning scenarios have led to sizable cuts in those requirements. Today, between military medical facilities, hospitals run by the Department of Veterans Affairs, and civilian facilities that have agreed to provide beds during a national emergency, the military has access to more than twice the hospital capacity needed to meet the current wartime demand for 13,400 beds. Moreover, even after making the reductions in this option, DoD would still have about 9,000 beds in its expanded system—a much higher percentage of its wartime requirement than it met during the Cold War.

DoD would probably see several disadvantages, however, to making such deep cuts to its health care system. Military medical officials argue that DoD facilities and the care they provide in peacetime are essential for recruiting and training physicians and ensuring medical readiness. Downsizing that system to such an extent would require DoD to modify the way it trains and prepares for wartime. For example, it would need to strengthen ties with the civilian sector to provide casualty training for military medical personnel and to continue ensuring an adequate supply of beds for wartime.

Another potential drawback of this option is that some beneficiaries who enrolled in FEHB plans would pay substantially more out of pocket than they do for care in the military system. Military retirees and their dependents would pay about 30 percent of their FEHB premium. (Dependents of active-duty members would pay little or no premium after receiving their voucher.) And enrollees in most FEHB plans would face copayments or deductibles for outpatient visits, prescription drugs, and other medical services.

Proponents of this option would counter that higher out-of-pocket costs could prompt more prudent use of medical care than in DoD's direct care system, where many services are provided at no or low cost. In addition, they might say, many FEHB plans would offer improved coverage and so might be worth the greater out-of-pocket expense. Moreover, the value of DoD's health benefits has grown dramatically with advances in technology and medical practices. Thus, proponents would argue, it is reasonable for military beneficiaries to share more of the costs associated with those advances—as many people covered by employer-sponsored plans in the private sector already do. □

Option 050-40
Revise Cost Sharing for Military Health Benefits

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-475	-401
2003	-592	-560
2004	-615	-602
2005	-638	-631
2006	-661	-655
2002-2006	-2,981	-2,848
2002-2011	-6,674	-6,505

RELATED CBO PUBLICATION:

Restructuring Military Medical Care (Paper), July 1995.

This option would make three changes to the military health care system. First, all beneficiaries would be

required to enroll in a Tricare plan before using the system. The annual enrollment fee for Tricare Prime would remain the same (no charge for active-duty personnel and their families; $230 for single coverage or $460 for family coverage for retirees). Under Tricare Extra or Standard, active-duty families would still pay no fee, but retirees (whether younger or older than 65) would pay $115 a year for single or $230 for family coverage. Second, the Department of Defense would adjust enrollment fees for inflation by the annual change in the consumer price index for medical expenses. Third, users of Tricare Prime would pay the same copayments for outpatient care at military facilities (where they now pay nothing) as they had been paying at civilian providers. In addition, all retirees would begin to pay small copayments if they chose to receive care at military facilities.

Together, those three changes would save DoD about $400 million in outlays in 2002 and $6.5 billion through 2011. The savings would stem from enrollment fees, increased copayment charges, and more prudent use of care by beneficiaries. Under current law, DoD is allowed to spend some of the revenues it collects through copayments. This estimate assumes that the Congress would reduce DoD's appropriations by the amount of revenue collected under the option. However, if the Congress revoked DoD's automatic reimbursement authority, some of the savings would take the form of an offset to mandatory spending.

By requiring beneficiaries to enroll in a Tricare plan, DoD could identify who uses its medical system. Military providers need to plan for the health care needs of a defined population to develop per capita budgets and build cost-effective delivery networks.

Proponents of this option could argue that the value of DoD's health benefits has risen with advances in medical technology, so users should expect to bear some of the associated cost, just as employees of private firms do. In addition, charging copayments would help curb excessive use of services.

On the negative side, many military families and retirees would view even modest copayments at military facilities as an erosion of their benefits. Retention and morale might suffer, even though this option would still offer service members and their families more generous health benefits than most government or private-sector employers do. □

Option 050-41
Have DoD and VA Purchase Drugs Jointly

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-33	-26
2003	-86	-74
2004	-111	-102
2005	-123	-118
2006	-138	-133
2002-2006	-491	-454
2002-2011	-1,431	-1,366

In 1999, the Departments of Defense and Veterans Affairs (VA) together spent about $2.4 billion on prescription drugs for patients in their health care systems. Nationwide, spending on prescription drugs has grown roughly twice as fast in recent years as total national health spending. Constraining such cost growth is an important goal for DoD and VA: each operates its large health care system on a fixed annual appropriation, so spending more on prescription drugs means it has fewer resources to devote to other types of care for its beneficiaries.

This option would consolidate DoD's and VA's purchases of pharmaceutical products, as the Congressional Commission on Servicemembers and Veterans Transition Assistance recommended in 1999. Specifically, it would require the two agencies to organize a joint procurement office and develop a common clinically based formulary (a list of prescription drugs that both agencies' health plans would agree to provide). Formularies can save money by encouraging providers to substitute generic versions for brand-

name drugs or by selecting one or more preferred brand-name drugs within a therapeutic class. The joint formulary would apply throughout the VA health system, to mail-order pharmacy services, and at military hospitals and clinics. Once in place, it would allow the agencies to enter into more "committed volume" contracts with pharmaceutical manufacturers, which generally lead to lower drug prices. In addition, this option would merge the two agencies' mail-order pharmacy services. Those changes would save DoD and VA a total of $26 million in outlays in 2002 and nearly $1.4 billion through 2011.

In recent years, DoD and VA have made efforts to combine some purchases, but that collaboration is limited, and they continue to maintain separate formularies and procurement offices. The VA's National Acquisition Center is responsible for purchasing prescription drugs for most federal agencies except DoD, and it negotiates and maintains the federal supply schedules of prices for those items. The Defense Supply Center Philadelphia (DSCP), an office of the Defense Logistics Agency, negotiates prices for pharmaceutical products and draws up contracts with vendors to buy and deliver those products to military treatment facilities. DSCP also makes plans to deliver those items overseas quickly in the event of a conflict.

Proponents of joint purchasing would argue that DoD and VA need to rein in the rapid growth of prescription drug costs. Without such measures, both agencies may be forced to ration more tightly the care they provide. In addition, those proponents would say, the need for separate procurement offices is not apparent. According to a 1998 report by DoD's Inspector General, only 0.05 percent of the items that the DSCP procures on behalf of military facilities are "militarily unique"; most are common items. VA officials maintain that the National Acquisition Center has already achieved significant savings on many of its pharmaceutical purchases through committed-volume contracts. A recent study by the Institute of Medicine seems to confirm that point: it estimated that the VA saved about 15 percent on drug purchases in six therapeutic classes by selecting a preferred drug in each class.

In developing a common formulary, the two agencies would need to adopt procedures by which physicians could prescribe nonformulary drugs to patients who needed them. (For example, a patient would require an alternative drug if he or she was allergic to the formulary drug in a therapeutic class.) The design and execution of such an exception process would affect the savings from this option. The stricter the process, the higher would be the cost of documenting and judging the patient's need for a nonformulary drug. A less restrictive process, however, would reduce the government's bargaining power and could reduce the savings from this option.

Critics of consolidation argue that such savings are unachievable anyway. The veterans who obtain health care from the VA make up a very different mix of medical cases than military beneficiaries do—for example, more of them suffer from mental illness, substance abuse, or severe disabilities (such as spinal cord injuries). Thus, the degree of overlap in prescription drugs dispensed by the two agencies may be limited.

Opponents of this option also argue that DoD and VA have already taken important steps to expand their joint procurement. They have entered into 29 joint national contracts to buy pharmaceutical products. Some officials believe that the agencies will achieve the bulk of any possible savings simply by sharing price data with one another so they can negotiate the lowest prices with pharmaceutical manufacturers and suppliers. Moreover, DoD officials contend that they must maintain their own procurement office to ensure that drug supplies will be available quickly in the event of war.

Other critics, however, might argue that this option would not go far enough. Savings could be even larger if DoD implemented a uniform formulary for all three types of pharmacies that its beneficiaries use: pharmacies at military hospitals and clinics, the mail-order service, and retail pharmacies (where beneficiaries receive partial reimbursement through insurance). DoD officials say that as they have tightened the formularies of drugs available at military facilities, beneficiaries have increasingly turned to retail outlets—which often costs DoD more than if the department had purchased the drugs at federal prices and dispensed them itself. (Consequently, the estimate for this option assumes that DoD's insurance claims for pharmacy services would increase.)

If DoD could enforce a single formulary at all pharmacy outlets, it would enjoy greater savings. □

Other Noncash Benefits

The military has traditionally provided a much broader array of noncash benefits than most civilian employers. Besides health care, the list includes subsidized on-base housing; commissaries (on-base grocery stores); exchanges (general retail stores); child care; and morale, welfare, and recreation programs (golf courses, fitness centers, social clubs, and the like). For the most part, DoD relies on in-house organizations rather than private contractors to provide those subsidized goods and services.

In general, both economic theory and the commonsense notion that people are the best judge of where they would like to spend their money suggest that cash payments—rather than in-kind or noncash benefits—should play a dominant role in compensation. When private employers provide health care and other noncash benefits, it is often because that approach allows them to offer tax-free compensation or to take advantage of their ability to purchase goods and services at a lower price than employees could on their own.

Military leaders often point out that noncash benefits are likely to offer some special advantages to both individual service members and DoD. Those benefits mean that military personnel have familiar services readily available as they and their families move from one unfamiliar base to another. Noncash benefits, and the associated on-base lifestyle, can also provide a sense of belonging to an organization that cares for its members and their families. Likewise, such benefits can send the message that DoD is not just another employer and military service is not just a job. Among officers in critical specialties, military values and lifestyle and a sense of esprit de corps are the most frequently cited reasons to stay in the service.[8]

Nonetheless, DoD's noncash benefit programs entail significant costs. Moreover, changes in the civilian economy (such as the growth of discount retailers that compete with on-base stores) and the aging of DoD's infrastructure of housing and other facilities have made it more difficult for DoD to offer high-quality goods and services at below-market prices. A 1997 report by the Congressionally mandated National Defense Panel—a group that included four retired general officers—suggested that it might be time for DoD to reassess the role of military communities and noncash benefits.[9] Panel members said that military personnel might be better off if some of the resources devoted to providing benefits such as housing, schools, medical care, and retail stores were instead devoted to raising cash compensation.

This section provides an array of options dealing with noncash benefits. Some would increase funding for those benefits. Others would reduce the cost of providing noncash benefits or replace them with cash payments. Still others would make the costs of noncash compensation more visible to encourage DoD and service members to make choices between cash and noncash benefits.

Option 050-42
Consolidate Military Personnel Costs in a Single Appropriation

More than 20 percent of the federal government's costs to recruit and retain military personnel fall outside the military personnel appropriation of the Department of Defense. The costs for many personnel benefits—commissaries, medical care, DoD schools, and on-base family housing—are paid by DoD out of other appropriations. Some additional benefits, such as the Montgomery GI Bill and veterans' disability payments, are paid by the Department of Veterans Affairs (VA). This option would realign appropriations so the full cost of attracting and retaining military personnel appeared in DoD's military personnel account.

Under this option, each of the DoD-funded personnel-support costs mentioned above would become a budget activity or subactivity within the mili-

8. General Accounting Office, *Perspectives of Surveyed Service Members in Retention Critical Specialties*, GAO/NSIAD-99-197BR (August 1999), p. 30.

9. National Defense Panel, *Transforming Defense: National Security in the 21st Century* (December 1997), p. 83.

tary personnel appropriation. Some VA programs might also be funded in the defense budget. The realignment of appropriations would have two related goals: to provide more accurate information about how much money is being allocated to support military personnel, and to give DoD managers more incentive to use resources wisely.

The current distribution of personnel costs among different appropriations makes it difficult for DoD, the Congress, or taxpayers to track the total level of resources devoted to supporting military personnel. Changes in the appropriation level for military personnel can be either offset or enhanced by changes in the resources devoted to health care, housing, or education benefits. The total picture is rarely, if ever, seen—making it hard to analyze total compensation or make comparisons with civilian compensation.

In addition, because personnel-support costs and military training and operating costs are mixed within the operation and maintenance (O&M) appropriation, interpreting trends in that important appropriation can be difficult. How much of the past growth in O&M spending per active-duty member resulted from growth in personnel costs, such as medical benefits, and how much resulted from changes in the cost of operating military units and installations?

The current distribution of personnel costs among appropriations and agencies can also distort the incentives that managers face. For example, because the costs of enhanced benefits under the Montgomery GI Bill would be paid by the VA, managers at DoD have little reason to ask whether other recruiting incentives might be more cost-effective. Similarly, compensation managers have little incentive to seek the most cost-effective mix of cash and in-kind benefits as long as DoD pays for in-kind benefits such as commissaries and housing out of different appropriations than cash benefits. With separate appropriations, no reliable mechanism exists to ensure that funds taken from in-kind benefits will be returned to service members in the form of pay raises. If both cash and in-kind benefits were paid from a single appropriation, the demand for greater in-kind benefits might be muted, and it might be easier for both the Congress and DoD managers to show service members that changes in benefits were not an erosion in the total compensation package. A consolidated budget for personnel support could even lead to growth of in-kind compensation when that was, in fact, the most cost-effective approach.

How much this option might save is unknown (thus, no savings table is shown). But with the total cost of supporting military personnel at about $95 billion a year, the potential savings from better management of those costs are substantial. (Savings of just 1 percent, for example, would equal almost $1 billion annually.)

In addition to providing savings, this option could lead to a realignment of responsibilities within the military services. Although no change would be required, the new approach to appropriations might eventually result in the consolidation of personnel-support functions under a single Assistant Secretary in each service and the Office of the Secretary of Defense. That realignment might in turn contribute to better coordination among the different personnel-support functions.

One potential disadvantage of this option is that it would require DoD to revise both the financial management systems used to track budget authority and outlays and the budget exhibits it prepares for the Congress. But because DoD already tracks the costs of its various personnel-support programs separately, moving those programs to a different appropriation would involve reorganizing current data rather than collecting new data.

A much more serious drawback of this option is that the new structure for appropriations could require changing the responsibilities and possibly the structure of the various Congressional subcommittees that authorize and appropriate funds for defense. That could prove difficult and controversial. □

Option 050-43
Increase Housing Allowances to the Full Cost of Adequate Housing

About one-third of military families live in housing units provided without charge by the Department of Defense. The other two-thirds rent or own housing in off-base communities and receive a cash allowance

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	348	322
2003	633	604
2004	326	339
2005	0	26
2006	0	6
2002-2006	1,306	1,297
2002-2011	1,306	1,300

RELATED CBO PUBLICATION:

Housing Prices, Housing Choices, and Military Housing Allowances (Paper), October 1998.

that typically covers only a portion of their housing costs; they must pay the remainder out of their own pocket (that is, from sources other than their housing allowance). During most of the 1980s and 1990s, military families living off-base typically paid about 20 percent of their housing costs out of pocket. The inequity of that arrangement has long been recognized, and the out-of-pocket costs contribute to a high demand for on-base family housing even though many on-base units are aging and in poor repair.

In 2000, DoD asked the Congress for authority —which was granted—to raise housing allowances. The department planned to increase allowances gradually until, by 2005, a military family (or single service member) living in off-base housing of standard quality would have no out-of-pocket costs. In the first step of that plan, out-of-pocket costs would drop to about 15 percent in 2001.

This option would accelerate DoD's planned transition by two years, cutting out-of-pocket costs to just over 7 percent in 2002 and eliminating them in 2003. (Under DoD's plan, families would still be paying more than 7 percent of their housing costs out of pocket in 2003.) The faster schedule would cost about $1.3 billion more from 2002 through 2005 than DoD's current plan. In 2006 and beyond, both plans would cost roughly $1.9 billion a year.

Raising housing allowances would directly benefit the roughly 750,000 active-duty personnel (both single and married) who live in private housing. In addition, it would contribute indirectly to improving the quality of DoD's on-base housing units. Recently, DoD has been experimenting with public/private partnerships designed to provide private capital for replacing and revitalizing on-base housing. Higher allowances would make the partnerships—whose return on investment typically depends on the size of those allowances—more appealing to private firms. Moreover, because service members would no longer have a financial reason to accept poor-quality on-base units, queues for on-base housing would decline, and base commanders would have a strong incentive either to improve or to demolish substandard units. That situation could help resolve DoD's housing problems and allow the department to reduce its role as a direct provider of housing. (For another way to reduce demand for on-base housing, see the next option.)

Proponents of this option could argue that accelerating the current plan would signal the seriousness of DoD's and the Congress's commitment to raising housing allowances and help ensure that the current momentum was not lost before the goal of eliminating out-of-pocket costs was met. To potential private partners, the strong signal would reduce uncertainty about their future returns. To service members struggling to cover their housing costs, it could serve as dramatic, visible evidence of DoD's desire to improve their welfare. Thus, a more rapid increase in housing allowances could have an immediate impact on morale and retention—two areas of particular concern to policymakers.

People who favor DoD's plan for a slower transition might argue that local commanders will need time to adjust to the reduced demand for on-base housing. At some installations, for example, DoD holds long-term leases on privately owned housing that it provides to military families. If service members suddenly decided to rent private units on their own, DoD might have to absorb the costs of leases on vacant housing, offer that housing to personnel in lower pay grades than those for whom it was intended, or revert to its largely forgotten policy of requiring members to accept government housing (if that housing meets minimum standards).

Other observers might object to both this option and DoD's plan to eliminate out-of-pocket housing costs by 2005. Either plan would carry a high price tag and could be seen as reinforcing DoD's commitment to a system of pay and allowances that many people outside the military consider unduly complicated and inefficient. Opponents could argue that those plans should include the elimination of inequitable pay differences between married and single personnel and the eventual adoption of a simple salary system for the military (see option 050-36). □

Option 050-44
Increase Competition Between DoD and Private-Sector Housing

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-695	-35
2003	-709	-315
2004	-723	-551
2005	-736	-637
2006	-751	-677
2002-2006	-3,614	-2,216
2002-2011	-7,596	-6,026

RELATED CBO PUBLICATION:

Military Family Housing in the United States (Study), September 1993.

Most military families receive cash allowances for housing and buy or rent dwellings in the private sector. About one-third, however, live rent-free in on-base housing. It costs the Department of Defense about 35 percent more to provide a housing unit than it costs to rent a comparable unit in the private sector. Despite the cost, DoD intends to keep its inventory of housing. The department has been experimenting with public/private partnerships that could provide private capital to replace or revitalize on-base housing units, many of which are nearing the end of their service life. DoD plans to increase the number of such partnership arrangements under a five-year extension of authority that the Congress granted in 2000. Progress to date, however, has been less than planned, and many families remain in substandard units. Moreover, whether such partnerships will reduce the long-term costs to DoD of providing on-base housing is uncertain.

This option would reduce the demand for on-base housing by requiring it to compete with private-sector housing. All military families would receive a cash housing allowance and be free to choose between DoD and private-sector units. DoD—and any companies it takes on as partners—would act like a private landlord, setting rents for on-base units at market-clearing levels (levels at which there would be neither excess vacancies nor waiting lists). On-base housing units would be replaced or revitalized if they met one of two criteria: their value to service members (the market-clearing rent they could command) was sufficient to cover both operating costs and amortized capital costs, or DoD deemed the units indispensable because of their historical nature or importance for military readiness. Those criteria would limit DoD to revitalizing or replacing about 25 percent of its existing housing stock.

The principal advantage of this option would be savings to DoD, which could amount to more than $6 billion in outlays through 2011. The main source of those savings would be lower revitalization and replacement costs as DoD retired aging units rather than investing in ones that could not cover their costs in competition with private-sector housing. Among other advantages, this option would let DoD focus on its warfighting mission rather than on real estate management, eliminate waiting lists for on-base units, and equalize the value of the housing benefits that it provides to families living on- and off-base. (For a different approach to equalizing those benefits, see the previous option.) Moreover, the housing costs that service members as a whole pay out of pocket would not change: if rents paid to DoD exceeded the housing allowances paid to personnel living in DoD units, the excess would be returned to all service members through an increase in allowance rates.

The main disadvantage of this option is that although, on average, military families would not pay more out of pocket, families that chose to live on-base would face higher costs than they do today. In addition, opponents of these changes might argue that housing soldiers and their families on-base promotes esprit de corps, morale, and a sense that the military "takes care of its own." This option would represent a significant break with military tradition. As a result, it could have a negative impact on morale unless it received strong public support from senior military leaders. □

Option 050-45
Create Incentives for Military Families to Save Energy

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-5	-5
2003	-26	-26
2004	-54	-54
2005	-67	-67
2006	-68	-68
2002-2006	-220	-220
2002-2011	-581	-581

RELATED CBO PUBLICATION:

Military Family Housing in the United States (Study), September 1993.

The Department of Defense spent about $303 million last year on gas, electricity, and water for the approximately 211,000 family housing units in the United States that it owns. DoD's efforts to reduce those costs by promoting resource conservation have met with limited success. One reason is that service members living in DoD-owned housing do not pay for their utilities and may not even know how much gas, electricity, and water they use. Landlords in the private sector have found that utility use typically declines by about 20 percent when tenants are responsible for their own utility bills.

This option would install utility meters in DoD housing units, provide cash utility allowances to the families living there, and then charge for utilities based on actual use. Residents who spent less than their allowance could keep the savings; those who spent more would pay the extra cost out of pocket. The budget for allowances would be set equal to the expected cost of utilities under the new system, or about 80 percent of what DoD now spends. The department would allocate that amount among the different housing units on the basis of their size, energy efficiency, and location. Once the program was established, the allowance budget for each year could be set equal to the previous year's actual utility charges plus an adjustment for inflation. As such, if service members were able to cut their utility usage by more than 20 percent, allowances would fall and the savings from this option would increase. If, however, 20 percent overestimates members' true ability to conserve, allowances would be higher and the savings would be less.

Because families who conserved aggressively would receive more in allowances than they would be charged for utilities, this option would reward people who tried to conserve energy. Families who did not economize would face utility bills in excess of their allowance. However, in the case of some housing units, the allowances might not account for physical characteristics that made energy conservation difficult. People living in such a unit might find that the allowance did not cover all of their utility costs even after they had made reasonable conservation efforts.

The principal advantage of this option is that it would reduce DoD's costs by giving military families who live on-base the same incentives for conservation as most homeowners and renters—including military families living off-base. Although DoD would incur the up-front costs of determining allowance amounts, setting up a billing system, and installing meters, this option could provide total savings of $581 million from 2002 through 2011.

Many DoD housing units already have a connection where a meter could be installed. Nonetheless, a temporary exemption from the metering requirement

(and the utility allowances and charges) could be given for some older units if the Secretary of Defense certified that metering them was not feasible. □

Option 050-46
Improve Military Families' Access to Child Care

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	599	339
2003	1,052	826
2004	992	982
2005	930	1,002
2006	954	984
2002-2006	4,527	4,133
2002-2011	9,666	9,229

Access to affordable, high-quality child care is important to many families of military and civilian personnel of the Department of Defense. Obtaining that access, however, can be particularly difficult for employees at isolated bases or for military families who must move frequently.

This option would increase DoD's support for child care in two ways. First, it would provide $434 million over five years for constructing DoD child care centers (to create spaces for an additional 25,000 children) as well as funds to cover DoD's share of the operating costs of those spaces. Second, it would provide matching funds to military families with eligible child care expenses who were either unable to get slots in DoD centers or preferred to rely on in-home or other sources of care. (Eligible expenses would be defined in the same way that they are for the federal tax credit for child care.) DoD's matching rates would be set so that families who received matching funds got the same kind of subsidy as families who used DoD child care centers. Thus, although DoD would, on average, match expenditures on a one-for-one basis, the matching rate could be higher for junior personnel and lower for senior personnel. DoD's matching payments would be capped at $4,039 per child per year (adjusted for inflation), which equals the department's average share of the operating cost of a slot in a child care center.

DoD helps ensure access to child care through two main programs. One program consists of around 800 day care centers (known as child care development centers) that DoD runs on military bases. Those high-quality centers have the capacity to care for about 60,000 children. Fees paid by patrons cover about half of the centers' operating costs, and appropriated funds cover the rest. The other program is a network of DoD-certified in-home caregivers, or family child care homes. Those in-home caregivers are often the spouses of military personnel. DoD has certified almost 10,000 in-home caregivers, who can care for about 60,000 children, and the services are beginning to encourage more use of those family child care homes. Military families who use that type of care generally pay the full cost, although the services share part of it at some installations.

Despite their size, those two programs serve only a minority of the DoD workers in need of child care. Most military families rely on the same kinds of public and private child care arrangements as non-DoD employees. In some cases, that is a matter of preference; in other cases, it reflects a shortage of DoD-sponsored care. According to the department, another 256,000 child care spaces (in either centers or family homes) are necessary to fully meet the needs of military families. The demand for additional spaces in on-base child development centers is particularly acute; applicants often face long waiting lists. But DoD's ability to provide additional slots in those centers is limited both by the initial cost of construction and by the need to cover half of the annual operating costs.

This option would not resolve all of DoD's child care issues; some DoD centers might continue to have waiting lists. Nonetheless, the additional funds for child care centers and the matching grants included in this option would have an immediate impact on service members' access to high-quality, affordable child care. Not only would care in the DoD centers be more readily available, but the matching

payments would encourage families who do not use those centers to seek higher-quality care than they might otherwise, since they would pay only half of the additional cost.

The price tag for that improved access would be substantial—about $1 billion annually—because it would benefit all military families who needed child care, not just those who used on-base centers. Families who preferred in-home care for their children, had special needs that their local DoD center could not meet, were seeking care near an off-base home or workplace, or needed child care on an unscheduled basis, only in the summer, or overnight would no longer be at a disadvantage relative to those preferring care in large on-base centers. A child care system that provided support to all families in need might appear more equitable than the current system.

Wider access to child care benefits would also have a negative aspect, however. It would widen the already significant gap between the value of the compensation packages that DoD provides to single and to married personnel (see option 050-36). One way to alleviate that concern and also reduce the cost of this option would be to lower the average matching rate for in-home or other child care. But unless the law that requires DoD to pay half of the operating costs of on-base centers was changed, that approach would leave families who relied on the matching grants at a disadvantage relative to those who used on-base centers.

In the long run, the matching payments in this option could reduce the pressure on DoD to expand its system of on-base care. That would be a disadvantage in the eyes of people who feel that the current system helps foster a sense of community by encouraging military families to bring their children to the base for day care even if they live off-base. But two advantages would potentially offset that disadvantage. First, this option would allow DoD to concentrate more on its core missions. Second, and perhaps more important, this option would provide immediate relief to many military families seeking affordable child care. □

Option 050-47
Consolidate and Encourage Efficiencies in Military Exchanges

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-59	-43
2003	-80	-70
2004	-100	-92
2005	-103	-99
2006	-106	-103
2002-2006	-447	-408
2002-2011	-1,016	-968

RELATED CBO PUBLICATION:

The Costs and Benefits of Retail Activities at Military Bases (Study), October 1997.

The Department of Defense operates three chains of military exchanges—the Army and Air Force Exchange Service, the Navy Exchange Command, and the Marine Corps exchange system. Those chains provide a wide array of retail stores and consumer services at military bases and have combined annual sales of about $10 billion.

This option would consolidate the three systems into a single retail organization. In addition, it would introduce incentives for more efficient operations by requiring the combined system to pay all of its operating costs out of its own sales revenue, rather than relying on DoD to provide some services free of charge. Those changes would save more than $100 million annually—approximately $65 million from the consolidation and $45 million from operating efficiencies. (The next option would go one step farther and consolidate the exchanges with DoD's separate network of commissaries.)

Numerous studies sponsored by the Office of the Secretary of Defense have shown that consolidating the exchange systems could lead to significant

efficiencies. It would eliminate the costs of duplicative purchasing and personnel departments, warehouse and distribution systems, and management headquarters. Although consolidation would entail some one-time costs, the Congressional Budget Office estimates that those costs would be more than offset by one-time savings from the reduction in inventories that consolidation would permit.

Besides consolidating the three systems, this option would encourage more efficient use of resources and improve the exchanges' visibility in the defense budget by requiring the combined system to pay all of its operating costs out of sales receipts. DoD provides the exchanges with about $400 million in free services each year, CBO estimates. Those services include maintaining some parts of exchange buildings (such as roofs, windows, and heating and cooling systems), transporting goods overseas, and providing utilities at overseas stores. Under this option, the combined system would reimburse DoD for the cost of such services and would thus have an incentive to economize on their use.

Today, earnings from the exchanges are used to support the military's morale, welfare, and recreation (MWR) activities, which contribute to service members' quality of life. If the combined exchange system continued to provide earnings to support MWR programs, it would do so from earnings that represented receipts in excess of the full cost of exchange operations. To compensate the MWR programs for the lower exchange earnings that could result, this option assumes that the Congress would appropriate additional funds to those programs. That would increase the Congress's control over spending on MWR activities.

One obstacle to implementing this option would be the need to find an acceptable formula for allocating MWR funds among the individual services. The services might be concerned that they would not receive a fair share of the earnings from a combined exchange system or of the additional appropriations for MWR activities. In addition, they might fear that over a period of years, the Congress would reduce the amount of additional funding appropriated for MWR programs.

Some critics of consolidation argue that the Navy Exchange Command and the Marine Corps system, with their unique service identities, are better able to meet the needs of their patrons than a larger, DoD-wide system would be. But proponents of consolidation point to the Army and Air Force Exchange Service, which has successfully served two distinct services for many years. People who shop in exchanges say their main concern is the ability of exchanges to offer low prices and a wide selection of goods—a concern that a consolidated system might be able to satisfy more effectively. □

Option 050-48
Consolidate DoD Retail Activities and Increase Cash Compensation

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	0	0
2003	0	0
2004	0	0
2005	0	0
2006	0	0
2002-2006	0	0
2002-2011	0	0

RELATED CBO PUBLICATION:

The Costs and Benefits of Retail Activities at Military Bases (Study), October 1997.

The Department of Defense operates four separate retail systems on military bases: a network of grocery stores (commissaries) for all of the services and three chains of general retail stores (exchanges) for the Army and Air Force, the Navy, and the Marine Corps. This option would consolidate those systems into a single, more efficient retail chain that would operate without any appropriated subsidy. The consolidated system would be responsible for giving military personnel access to low-cost groceries and other

retail goods at all DoD installations, including those in isolated or overseas locations.

The current commissary and exchange systems share the same goal, but they operate under very different funding mechanisms. The commissary system, which is run by the Defense Commissary Agency (DeCA), has annual sales of about $5 billion and also receives a Congressional appropriation of about $1 billion a year. The three exchange systems (the Army and Air Force Exchange Service, the Navy Exchange Command, and the Marine Corps exchange system) have annual sales totaling about $10 billion. They do not receive direct appropriations; instead, they rely on sales revenue to cover their costs.

One reason that exchanges can operate without an appropriated subsidy is that they charge their customers a higher markup over wholesale prices than commissaries do. Another reason is that the exchange systems are non-appropriated-fund (NAF) entities rather than federal agencies, which enables them to use more flexible and businesslike personnel and procurement practices. DeCA, by contrast, is a federal agency, so its employees are civil service personnel and it follows standard federal procurement practices.

Under this option, the commissary and exchange systems would be consolidated over a two-year period. When that process was complete, DoD's costs would be about $1.1 billion a year lower (in 2000 dollars)—about $1 billion from eliminating the subsidy for commissaries and $100 million from eliminating duplicative functions among the exchange systems. Rather than saving that money, however, this option would return the $1.1 billion to active-duty service members through either an increase in basic pay (averaging about $600 per member per year before taxes) or a tax-free grocery allowance of $1,000 per year payable to each member who is eligible to receive the current cash allowances to cover food costs. The pay raise or grocery allowance would be phased in to coincide with the consolidation of commissary and exchange stores at each base.

Low-cost on-base shopping has long been a benefit of military service. But recent declines in the size of U.S. forces and changes in the civilian retail industry have made it more difficult and costly for DoD's fragmented retail systems to provide that benefit. Both commissaries and exchanges must now compete with large discount chains that offer low-cost, one-stop shopping for groceries and general merchandise just outside the gates of many military installations.

The annual operating costs of a consolidated retail system using NAF rules would be about $250 million less than the combined costs of the four current systems, the Congressional Budget Office estimates. Nonetheless, to operate without appropriated funds, the consolidated system would have to charge about 10 percent more for groceries than commissaries do now. (That estimate is based on the difference between the 20 percent markup that exchanges charge and the 5 percent markup that commissaries charge, the amount that commissary customers currently pay to have their groceries bagged, and evidence that exchanges pay lower wholesale prices than commissaries do for the same goods.) At the current level of commissary sales, a 10 percent price increase would cost customers an extra $500 million annually.

About $250 million of that price increase would be borne by the military retirees who now shop in commissaries. As a result, this option could face strong opposition from associations of retirees. The average family of a retired service member would pay an additional $140 per year for groceries.

Active-duty members, by contrast, would clearly benefit from consolidation. The average active-duty family would pay about $230 more per year for groceries—far less than the additional basic pay or grocery allowance they would receive under this option. (A military family would have to spend about $10,000 per year on groceries in commissaries before a 10 percent price increase outweighed the benefits of a $1,000 allowance.) Cash allowances would be particularly attractive to personnel who live off-base and can shop near their home more conveniently than on-base. Moreover, all military families—active-duty, reserve, and retired—would gain from longer store hours, more convenient one-stop shopping, access to private-label groceries (not currently available in commissaries), and the security of a military shopping benefit that did not depend on the annual appropriation process.

DoD could target the $1.1 billion in cash payments to service members in a variety of ways. An allowance based solely on pay grade might be the most effective in enhancing retention and rewarding service members for their work. However, some people might argue that an allowance tied to pay grade and family size would be more equitable. If desired, supplemental payments could be made to junior enlisted personnel who have large families and might otherwise be eligible for Food Stamps.

Under this option, commissary patrons as a whole would give up about $500 million a year in savings in exchange for $1.1 billion in cash payments to active-duty personnel. Such a trade-off could increase retention among active-duty members. Nonetheless, the change would represent a break with military tradition. Thus, unless it received public support from senior military leaders, it might harm the morale of the active-duty force. □

Option 050-49
Eliminate DoD's Elementary and Secondary Schools

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	19	17
2003	-3	-1
2004	-30	-27
2005	-51	-48
2006	-68	-66
2002-2006	-133	-125
2002-2011	-746	-730

The Domestic Dependent Elementary and Secondary Schools (DDESS) system operates schools on several military bases in the United States to educate dependents of military personnel living on those bases. The Department of Defense also operates a separate school system for military dependents living overseas.

This option would phase out most of the schools that DDESS runs in favor of increased use of local public schools and would consolidate management of any remaining DDESS schools into the much larger overseas school system. Those changes would save DoD a total of $1.3 billion in outlays between 2002 and 2011. Savings for the federal government as a whole would be less—about $730 million through 2011—because the Department of Education would have to spend more on Impact Aid, which it provides to local school districts that enroll dependents of federal employees. (These cost estimates assume that funding for Impact Aid would immediately increase so that the average amount paid per student living on federal land would remain at its current level.)

Critics would argue that DDESS takes an uneven and largely arbitrary approach to educating the dependents of active-duty service members. The distribution of DDESS schools is mainly a historical accident, dating to the time when segregated public schools in the South did not adequately serve an integrated military. The great majority of military bases in the United States have no DDESS school. And where such schools do exist, they generally enroll only dependents of active-duty members who live on-base; those living off-base, and dependents of civilian employees, are the responsibility of local school districts. In addition, most bases with DDESS facilities offer only elementary and middle schools; high school students living on-base use the public schools. In most of the places where DDESS operates schools, accredited public schools are readily available—with the possible exceptions of Guam, Puerto Rico, and West Point, where DoD would continue to run domestic schools under this option.

Closing DDESS schools need not create major disruptions. The roughly 30,000 students who might be affected already change schools frequently, in large part because they move often as their military parent is reassigned. In many locations, the public school district could continue to use the DDESS facility. (DoD already offers support to some local dis-

tricts by allowing public schools to operate on-base or providing additional limited funding on a per-student basis.) Finally, to ease the transition, DDESS schools would be phased out at a rate of one per district per year rather than all at once. And the local school districts would receive additional one-time funding and transfer of facilities and equipment to help them absorb their new teaching load.

This option might have several disadvantages, however. First, many parents of DDESS students might be reluctant to see the schools phased out because they believe DoD schools offer higher-quality education. Second, if local school districts did not maintain the on-base schools, former DDESS students might face longer commutes. Third, some of the savings to the federal government from this option would be offset by increased costs to local school districts. In the past, those districts have effectively been subsidized by not having to pay any of the costs of educating DDESS students while receiving at least some direct and indirect tax revenues from their parents. This option would eliminate that subsidy. □

Requirements for Personnel

As it does for virtually every other aspect of the armed forces, DoD has stated requirements for numbers of military personnel. But there is not always a clear relationship between those requirements and DoD's military capabilities. Before devoting resources to meeting personnel requirements, it may be appropriate for DoD to reassess them.

Two options below examine ways that DoD might achieve a more cost-effective military force by changing its stated requirements for personnel. One outlines ways to reduce requirements for Air Force and Navy pilots by changing the traditional career paths for those officers. The other option would return the ratio of enlisted personnel to officers and the proportion of officers in the field grades to the levels seen before the drawdown of the 1990s. That option is consistent with the view that recent trends in the officer corps have been driven not by requirements but by changes in the mix of personnel that emerged as a result of the drawdown.

Option 050-50
Cut Requirements for Pilots in Nonflying Positions

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-66	-52
2003	-95	-86
2004	-114	-107
2005	-134	-127
2006	-154	-147
2002-2006	-563	-520
2002-2011	-1,482	-1,422

RELATED CBO PUBLICATION:

Statement of Christopher Jehn, Assistant Director, National Security Division, before the Subcommittee on Military Personnel of the House Committee on Armed Services (Testimony), March 4, 1999.

The Air Force and the Navy have fewer pilots than their stated requirements call for. In 2000, the two services reported a combined shortfall of more than 2,400 pilots. The services have undertaken several initiatives to address that problem, including paying pilots special bonuses under the Aviation Continuation Pay program. But despite those efforts, pilot shortfalls are expected to persist for the foreseeable future.

Both services have many more pilots than they need to fill critical cockpit, or flying, positions. The shortfalls reflect the fact that they have included many positions that do not routinely involve flying in their requirements for pilots (positions in such fields as air operations, research and development, and procurement management). At the end of 2000, for example, about 30 percent of the Air Force's roughly 12,300 pilots were in nonflying positions, as were about 12 percent of the Navy's 6,700 pilots.

The services have taken steps to reduce some of their stated requirements for pilots in nonflying positions. This option would emphasize more use of that approach to address the problem of pilot shortages. Cutting nonflying requirements by two-thirds would save $52 million in outlays in 2002 and $1.4 billion over 10 years by reducing the number of pilots who would need to be trained.

Supporters of this option would argue that some of the nonflying positions identified as needing pilots are already being adequately filled by personnel with other backgrounds. In addition, the services could employ aviation navigators in some nonflying positions that require the expertise of a pilot.

The principal disadvantage of this option is that reducing the number of nonflying positions reserved for pilots could limit pilots' opportunity to gain the broader experience they need to progress in their careers. That problem might be alleviated, however, if the Air Force and Navy established a fly-only career path specifically for pilots who wanted to spend all 20 years of their military service in flying assignments. (Some pilots have indicated that they joined the military to fly and might be willing to stay in such a career path even if it limited their ability to be promoted.) A fly-only career path would lessen the number of nonflying positions needed to provide pilots with career-broadening opportunities. However, another disadvantage of cutting requirements for pilots in nonflying positions is that it might not leave enough shore positions for Navy pilots to rotate into between their tours at sea. □

Option 050-51
Restructure the Officer Corps

As part of the post-Cold War drawdown in the military, each of the services cut its officer corps significantly. Those cuts, however, were accompanied by a change in the composition of the armed forces. The ratio of enlisted personnel to officers declined from 6.0 to 1 in 1989 to 5.3 to 1 in 2000 because the officer corps was cut by a smaller percentage than enlisted personnel. The percentage of senior officers—those in the general or flag grades as well as the so-called field grades (major through colonel)—rose. The percentage of officers who entered the military through the service academies also increased.

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	266	26
2003	11	-169
2004	-266	-396
2005	-559	-639
2006	-1,192	-972
2002-2006	-1,740	-2,150
2002-2011	-8,373	-8,303

RELATED CBO PUBLICATION:

The Drawdown of the Military Officer Corps (Paper), November 1999.

This option would offset those apparent consequences of the drawdown. It would return the enlisted-to-officer ratio and the percentage of general and flag-level officers to the levels that existed in 1989, when the drawdown began. In addition, the percentage of newly commissioned officers trained in the service academies would be reduced. The option would also reduce the number of field-grade officers, restoring the limits on those positions to levels consistent with the Defense Officer Personnel Management Act before the drawdown. Those changes would save a total of $8.3 billion in outlays through 2011.

In carrying out the drawdown, the services tried to protect officers who were already in the force, many of whom had based their career expectations and financial plans on continued military service. The decline in the enlisted-to-officer ratio suggests that those efforts may have created an unbalanced force. The services might argue that the decline was driven by changing requirements as a result of new technologies and military doctrines that have decreased the need for enlisted personnel relative to the need for officers. But some critics see the timing of the shift as suspicious. Moreover, when the drawdown began, none of the services expected that their

future requirements for enlisted personnel would fall as much as they did relative to requirements for officers. This option would restore the enlisted-to-officer ratio to the 1989 level of 6.0 to 1 by reducing the size of the officer corps by about 11,800 and increasing the size of the enlisted force by an equal amount.

That reduction would be targeted primarily toward officers in the field, general, and flag grades. The percentage of general and flag officers would be reduced gradually to the 1989 level by restricting promotions into those grades. Reductions in the field grades could be achieved by encouraging officers to leave the service voluntarily, through such programs as the temporary early retirement authority (TERA), voluntary separation incentive (VSI), and special separation benefit (SSB). (Although those programs were used actively in the past, today their use is very limited.)

Over a period of four to five years, the number of general or flag officers would be reduced by about 200 through attrition, while about 10,800 field-grade officers and 830 junior officers (second lieutenant through captain) would be separated from service. Assuming that field-grade officers with less than 20 years of service would receive TERA and those with 6 to 15 years of service would receive VSI or SSB, the savings in pay would initially be offset entirely by the cost of separation payments. Through 2011, however, net savings in pay would amount to a total of $7.8 billion.

Supporters of this option would argue that the services' actions have resulted in a force that is too senior and contains more officers than needed to lead the remaining enlisted personnel. In their view, much of the expertise and combat readiness that senior officers provide could be obtained at lower cost from highly capable senior enlisted personnel and junior officers. Opponents, by contrast, might argue that separating additional senior officers would constitute a breach of faith because it would cut short the careers of some service members. Moreover, the services' efforts to implement the Goldwater-Nichols Defense Reorganization Act of 1986 and the Defense Acquisition Workforce Act of 1990 may have increased requirements for those relatively senior officers.

This option would also return the mix of academy and nonacademy graduates entering active duty to the level that prevailed before the drawdown. Although the number of students in the service academies declined during the drawdown, academy graduates now account for 13 percent of new officers compared with 9 percent in the early 1980s. Under this option, the total number of officer accessions would remain near the level planned by the Department of Defense, but the services would draw more officers from lower-cost commissioning programs—the Reserve Officer Training Corps (ROTC) and Officers Candidate School/Officer Training School (OCS/OTS)—and fewer from the more costly service academies. The estimated savings from that action reflect only the costs that would change in the near term, such as operating expenses and pay for faculty and cadets. Those savings would be partially offset by additional costs of about $138 million over 10 years to procure officers from OCS and ROTC to replace those from the academies. As a result, this change would save $14 million in outlays in 2002 and a total of nearly $553 million through 2011. In the longer term, savings might also accrue from changes in the academies' physical structure.

Supporters of changing the mix of new officers might argue that the academies are larger than many successful private colleges and that additional cuts to them are feasible. Moreover, a balanced mix of academy graduates and accessions from other commissioning programs may be needed to maintain good civil/military relations and ensure that the officer corps reflects the full diversity of U.S. society. Opponents of that change would contend that the service academies are the best source of future military leaders and that academy graduates are well worth the dollars spent on them. Some opponents might also argue that the academies have already reduced their class size to the minimum efficient level. □

Military Facilities and Equipment

To be ready for their missions, military units must have well-maintained equipment and facilities. Much of DoD's spending on readiness is devoted to that purpose. The department spends approximately $38 billion a year on maintaining equipment, including the costs of intermediate maintenance performed at

on-base repair shops, repair tasks performed at DoD's centralized maintenance depots, and tasks performed by contractors. In addition, it devotes almost $24 billion a year to replacing, operating, and maintaining its infrastructure of buildings and facilities.

Maintaining equipment and facilities contributes to readiness directly by improving a unit's ability to carry out its assigned duties. That effect is most evident in the case of maintenance for combat systems: one of DoD's most important indicators of readiness is the extent to which equipment is maintained in a condition that allows a unit to perform its missions (the mission-capable rate). The link between facilities and readiness is less direct, although senior defense officials argue that poorly maintained operational facilities can affect the safety and speed at which tasks are performed.

The quality of military equipment and facilities also contributes to readiness indirectly through its impact on morale, recruiting, and retention. That relationship may be most obvious in the case of quality-of-life facilities, such as on-base housing or buildings devoted to morale, welfare, and recreation programs. But poor working conditions and inadequately maintained equipment can also affect morale.

In addition, funds spent on keeping equipment and facilities from deteriorating and developing more serious maintenance problems contribute to readiness over the long run. By reducing the cost of future maintenance, those funds free up resources for other readiness needs. Even in the short run, failure to budget enough for maintaining and operating buildings can force base commanders to shift resources away from high-priority readiness programs (including unit training) to meet emergency needs.

Support of DoD Facilities. DoD is trying to develop a consistent and objective method for determining how much funding it requires to provide high-quality facilities for military personnel. Until it achieves that goal, estimates of funding shortfalls for maintenance of real property will remain uncertain. Nonetheless, comparisons of DoD spending with levels in the private sector suggest that the department tends to underfund real property maintenance. At various times, both the Congress and the Office of the Secretary of Defense have tried to increase that funding. In the late 1970s, the Congress responded to concerns about the "hollow force" by trying to keep the backlog of unfunded requirements for real property maintenance at the 1978 level. At other times, the defense planning guidance issued by the Secretary has set a minimum for the amount of real property maintenance to be funded relative to requirements. Among the options below are ones that would provide additional funding to maintain or replace aging facilities.

In many cases, however, DoD may not need to maintain its existing inventory of real property. The military has large numbers of excess bases and facilities. Since the beginning of the drawdown, the average square footage of DoD buildings per active-duty service member has risen by about 35 percent. Options that would allow DoD to close additional bases might help it bring its ownership costs under control. Other options that would reduce the need for additional funding would demolish excess buildings or lower the costs of operating buildings that remain in the inventory. In addition, options above that would reduce DoD's role in providing retail stores, housing, and medical care could significantly cut ownership costs by allowing the department to scale back the number of facilities it maintains.

Support of Equipment. The military also faces a number of challenges in its efforts to keep equipment in good working order. According to the services, the aging of equipment increases both the hours that must be spent on maintenance activities and the number and cost of spare parts. Other concerns cited by military leaders include a lack of well-trained maintenance personnel and wear and tear on equipment from an increased pace of operations. A further problem is shortages of spare parts—resulting not only from inadequate funding but also from inaccurate forecasts of requirements and poor control over existing inventories.

Despite those challenges, neither the Army nor the Marine Corps is reporting major problems with the readiness of equipment in its ground units. However, some observers believe that the two services' success in keeping their aging equipment mission-capable is being achieved at the cost of unreasonably long working hours for maintenance personnel. To the extent that excessive workloads affect retention, that may not be a sustainable strategy. Unit com-

manders in the Army report that the availability of maintenance personnel with the right skills and experience is their most significant equipment-readiness problem. And if maintenance personnel are heavily pressed in peacetime, their ability to maintain equipment at a wartime tempo of operations could be doubtful. Both the Army and the Marine Corps argue that modernization of equipment is necessary to prevent greater demands for maintenance in the future.

In the Air Force and Navy, by contrast, shortages of spare and repair parts have hurt the readiness of aviation units. The Navy reports that maintenance problems have contributed to a cycle in which the readiness of nondeployed air wings has declined further each year since 1996, forcing ever-greater shifts in resources to units just before deployment. In the Air Force, lack of adequate spare parts accounts for about half of the 10 percentage-point decline in overall mission-capable rates since 1991. Shortages of spare parts have also been a problem for Marine Corps aviation units. According to DoD, such shortages for Navy, Air Force, and Marine Corps aircraft result in part from unexpectedly high failure rates for some parts, past constraints on funding, and problems encountered in trying to introduce modern business practices, such as just-in-time delivery for spare parts.

Those problems, however, are not necessarily a sign that additional funding is needed now. It can take 12 to 36 months for spare-parts funding to affect supplies at the unit level, so today's low mission-capable rates in some operational units could be primarily a legacy of past problems. The Air Force and Navy continue to predict, as they have for some time, that funding now in the pipeline will improve their mission-capable rates. Whether past increases in funding for spare parts will significantly improve readiness in the near term remains to be seen.

Even if current funding is adequate and problems with equipment readiness are being resolved, additional steps may be needed to forestall future problems in both ground and air units as weapon systems continue to age. One of the options below looks at improving the condition of existing systems by replacing components that have high failure rates or rely on obsolete technology with more reliable components that, because they use current technology, might also be easier for the supply system to stock. Other options focus on DoD's ability to manage and control the cost of its maintenance activities. Although management initiatives are generally seen as ways to cut costs, they could also make high-quality maintenance less costly and thus more available over the long run.

Option 050-52
Increase Funding for Military Construction

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	767	104
2003	785	432
2004	801	655
2005	818	752
2006	834	806
2002-2006	4,005	2,749
2002-2011	8,431	7,151

When defense budgets are tight, one type of investment that is frequently deferred is military construction—particularly construction not associated with actions to close or realign military bases. Eventually, however, outdated or inadequate facilities can have a negative impact on the readiness and morale of U.S. troops. This option would increase funding for military construction by $750 million a year (in 2001 dollars) through 2011. Those funds would allow the Department of Defense to increase its military construction by more than 15 percent per year above planned levels.

At the current level of spending, DoD could replace its inventory of real property every 145 years—more than double the 67-year service life that the department recommends. Thus, when the average DoD facility reaches the end of its designated service life, it will be maintained rather than replaced. But as

facilities age, they often become more expensive to maintain. At some point, it may be cheaper to construct a new facility than to continue maintaining an older one. Additional funding for military construction would allow the services to replace facilities when that was cost-effective.

Each of the military services has expressed concern about the increasing age of its facilities. The services argue that additional funds are needed to finance projects directly related to mission capabilities (such as runways, piers, and training facilities) as well as quality-of-life projects (such as barracks) that contribute to readiness through their impact on retention and morale. The services always have a long list of construction projects they could undertake if funds were available, however, so it is difficult to know how much military construction funding they actually need.

One way to estimate that amount is to compare current funding with the levels of the 1980s, a period of relatively ample defense spending. The results of that comparison, however, vary widely depending on the measure used. To match the levels of spending per active-duty member seen in the 1980s, DoD would have to increase its planned spending by about $750 million a year (in 2001 dollars). To keep funding proportional to the square footage of buildings in DoD's inventory, by contrast, the increase would need to be about $2.3 billion a year. That latter amount is probably an overestimate because DoD has a large number of excess buildings in its inventory that will be demolished when they reach the end of their service life. To avoid giving DoD money to replace unneeded facilities, the funding increase in this option is based on the lower estimate.

The principal disadvantage of this option is its cost, which would amount to $8.4 billion over 10 years. Because military construction has an indirect impact on mission capabilities, the benefits of additional construction projects are difficult to quantify. Thus, it is unclear whether additional funds would be better spent on construction projects or on other defense needs, such as weapons procurement. In addition, extra funds run the risk of being earmarked for projects that DoD does not consider its most pressing needs. □

Option 050-53
Increase Funding for Real Property Maintenance

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	720	533
2003	742	690
2004	763	738
2005	783	772
2006	803	797
2002-2006	3,810	3,530
2002-2011	8,138	7,832

The services' real property maintenance (RPM) accounts are used to finance major and minor repairs, recurring maintenance, and related activities for the Department of Defense's stock of real property. RPM contributes to the readiness of U.S. forces by helping to ensure that facilities such as runways, docks, and piers are properly maintained and capable of their intended uses. In addition, DoD argues, having properly maintained facilities contributes to the quality of life of U.S. soldiers; crumbling roofs and exposed wiring in barracks, military hospitals, or work areas could be detrimental to morale, if not dangerous.

This option would increase funding for real property maintenance by $700 million per year (in 2001 dollars) in 2002 through 2011—from the current annual level of $5.3 billion up to $6 billion. That increase would cost DoD a total of about $8.1 billion in budget authority through 2011.

According to testimony given by the services, the condition of DoD facilities has degraded in recent years. The Army has testified that the average age of its facilities is 44 years, approaching the end of their designated service life (67 years). As facilities age, the amount of maintenance they require increases. Commanders at some installations have reallocated

resources originally appropriated for training and other operation and maintenance activities to their RPM accounts, which suggests the need for additional funding.

According to some criteria, DoD is significantly underfunding the maintenance of its facilities. For example, the Federal Facilities Council recommends funding maintenance activities for real property at a level of 2 percent to 4 percent of the cost to replace the property. DoD currently funds RPM at less than 1 percent of the replacement value of its inventory of facilities. Following the council's recommendation and funding maintenance at just 2 percent of replacement value would require an additional $7 billion per year.

The $700 million annual increase in this option would improve DoD's ability to maintain its facilities but would be unlikely to result in overfunding that might encourage the department to maintain unneeded facilities. The actual amount of additional funding that DoD might need is uncertain, however. DoD's Installations Policy Board is trying to determine the appropriate level of spending on property maintenance. The board is encouraging a number of cross-service programs to provide common definitions and standards for measuring requirements, but their work is not yet complete.

Some critics of this option would argue that DoD has other pressing needs, including weapons procurement, that have a better claim to additional resources. DoD could control maintenance costs, they would say, through other approaches, such as demolishing excess facilities (see option 050-55) or replacing aging structures. Other opponents of this option, however, would contend that an increase of $700 million a year might not be enough to allow DoD to stem the deterioration of its facilities. □

Option 050-54
Close and Realign Additional Military Bases

Beginning in the late 1980s, the Department of Defense sought to reduce its operating costs by closing unneeded military bases. Significant reductions in force structure at the end of the Cold War made many bases unnecessary. Because political and procedural difficulties had long made closing bases nearly impossible, the Congress set up four successive independent commissions on base realignment and closure (BRAC). Those commissions recommended shutting or realigning (moving departments and facilities at) hundreds of military installations in the United States, Puerto Rico, and Guam. When all of the actions from the four BRAC rounds are completed, DoD will save about $5.6 billion a year in operating costs, it estimates.

This option would authorize two additional rounds of base closures and realignments in 2003 and 2005. In the long run, such actions can produce substantial savings. However, they require some upfront investment, so costs would increase in the short run. Between 2002 and 2011, this option would reduce DoD's costs by a net total of $8.8 billion in budget authority. Beginning in 2012, the department could realize recurring savings of around $4 billion per year. Those estimates are based on DoD's experience and current projections for the earlier rounds of base closings. (The estimates do not include the costs of environmental cleanup, since DoD is obligated to incur such costs regardless of whether it operates or closes bases.)

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	0	0
2003	0	0
2004	554	172
2005	1,159	559
2006	867	790
2002-2006	2,580	1,521
2002-2011	-8,825	-4,366

RELATED CBO PUBLICATIONS:

Review of *The Report of the Department of Defense on Base Realignment and Closure* (Letter), July 1998.

Closing Military Bases: An Interim Assessment (Paper), December 1996.

Closing and realigning additional military bases is consistent with DoD's overall drawdown of forces. By several measures, planned force reductions significantly exceed the projected decrease in base capacity. For example, the department intends to cut the number of military and civilian personnel by 38 percent from the 1990 level. But according to DoD, only 21 percent of the base infrastructure in the United States has been eliminated.

The Secretary of Defense asked the Congress in early 1998 and again in early 2000 to authorize two more rounds of base closures. In *The Report of the Department of Defense on Base Realignment and Closure* of April 1998, DoD stated that opportunities exist for further cutbacks and consolidations at several types of bases—such as defense laboratories, test and evaluation installations, training facilities, naval bases, aircraft installations, and supply facilities. (A related option, 050-60, would authorize a BRAC round specifically for maintenance depots.)

Some analysts, however, argue that the BRAC cuts have gone far enough in matching the planned reductions in forces. The base structure, they say, should retain enough excess capacity to accommodate new risks to national security that could require a surge in the number of military forces. Opponents of more closures also cite the possible adverse economic effects on local communities. Some opponents suggest that savings could be made by demolishing certain buildings (see the next option) or by achieving other operating efficiencies short of closing bases. □

Option 050-55
Demolish Excess and Obsolete Structures

The defense drawdown has left many military bases with structures that the services no longer need and that have no remaining asset value. Those structures include buildings, such as schools and family housing units, as well as other facilities, such as piers and runways. In some cases, the structures are dangerous eyesores. In other cases, their availability attracts marginal users who benefit from occupying them because the users are not required to pay the full costs of the utilities and other support that the bases provide. Although demolishing those structures would entail up-front spending, it would allow the Department of Defense to avoid future maintenance costs. Estimates by DoD suggest that demolition projects may pay for themselves in as little as five years.

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	30	22
2003	23	22
2004	15	16
2005	7	9
2006	-31	-21
2002-2006	43	49
2002-2011	-129	-115

This option would increase funding to tear down excess, obsolete structures by $35 million a year over the 2002-2005 period. The majority of those annual funds, $30 million, would be allocated to the services' operation and maintenance (O&M) accounts to fund the demolition of excess facilities that are maintained with O&M dollars. The remaining $5 million would be allocated to the family housing accounts to pay for demolishing obsolete family housing units that are too costly to repair. Together, those funds would allow DoD to increase demolitions by 6 percent from planned levels and would generate more than $30 million in annual savings after 2005.

The services expect to tear down 80 million square feet of buildings by 2003 in accordance with a management reform that the Office of the Secretary of Defense (OSD) began in 1997. Recent defense plans have extended the Air Force's and Navy's demolition programs to 2005 to accommodate their large inventories of structures other than buildings. DoD plans to spend a total of $761 million on demolition programs during the 2001-2005 period, with an

estimated savings in O&M costs of $160 million a year after that.

However, DoD officials maintain that the department's inventory of real property will still contain excess structures, such as buildings and other facilities that are maintained with O&M dollars, after the current demolition programs are completed in 2005. Funding above planned levels would be necessary to demolish the rest of those excess structures and generate additional O&M savings. In addition, current OSD plans do not fund the destruction of excess, obsolete family housing units. Although the services' family housing commands have adopted demolition as a key tool in their strategies for real property management, critics argue that the resources devoted to those activities are inadequate.

The primary disadvantage of this option is that the quantity of structures that are both excess and obsolete is unclear. If DoD has underestimated its requirements for facilities, demolition programs may destroy a structure that has a potential use in the future. One alternative to demolition is to board up a facility and cease maintaining it. Nonetheless, as long as structures remain in DoD's inventory, the department is likely to feel pressure to maintain them and make them available to potential users. □

Option 050-56
Pay to Scrap Obsolete Ships in the National Defense Reserve Fleet

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	50	40
2003	50	50
2004	50	50
2005	50	50
2006	50	50
2002-2006	250	240
2002-2011	500	490

The National Defense Reserve Fleet was created in 1946 to meet the government's requirements for shipping during war or other national emergencies. Today, however, many of the ships in that fleet are very old, have no military value, and pose environmental hazards to the ports and bays where they are moored. The Maritime Administration (MARAD), which is responsible for disposing of obsolete ships held by the government, is unable to sell those ships for scrap. Nor does it have the authority or resources to have them scrapped itself. Consequently, the number of ships that MARAD must eventually dispose of is growing.

This option would provide $50 million a year for 10 years to eliminate the 158 ships in the fleet that are already awaiting scrapping. (The Congressional Budget Office estimates that $500 million should pay to scrap most, if not all, of those vessels.)

Until 1997, MARAD was able to sell obsolete ships to foreign companies that would scrap them. In that year, however, the Environmental Protection Agency (EPA) ruled that such sales introduced toxic substances into foreign commerce and thus violated the Toxic Substances Control Act. The Clinton Administration issued a moratorium that restricted MARAD from selling obsolete vessels to foreign countries. Although the moratorium expired in October 1999, MARAD, the EPA, and the Congress have not yet agreed on how or whether the agency can resume selling vessels for foreign scrapping.

The U.S. scrapping industry will not buy those ships for scrap because doing so would not be profitable. Before the ships could be scrapped, all of the environmentally hazardous materials would have to be removed, at a cost of $1 million to $2 million per vessel. But the market value of the scrap metal on the average ship is only about $600,000.

Although all of the ships that are ready to be scrapped require some environmental cleanup, many of them pose an immediate environmental threat to the areas where they are anchored (the James River in Virginia, Suisan Bay in California, and Beaumont, Texas). The ships contain hazardous materials, such as asbestos, cracked and pealing lead paint, PCBs, and fuel oil. Some are severely rusted. If the ships

are not scrapped, they must eventually be dry-docked on nearby beaches—at a cost of about $900,000 per vessel—to prevent contamination of the surrounding waters. And they will still have to be scrapped later.

This option would solve a problem that cannot continue indefinitely. Although maintaining obsolete ships is cheaper in the short run—approximately $3 million per year for all 158 ships that are awaiting scrapping—the hazards posed by those vessels will eventually be great enough to require a permanent solution. Thus, supporters would argue, it makes sense to act sooner rather than later. □

Option 050-57
Sell Surplus Lands Owned by the Department of Energy

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	0	0
2003	-3	-3
2004	-3	-3
2005	-3	-3
2006	-3	-3
2002-2006	-12	-12
2002-2011	-17	-17

The Department of Energy (DOE) controls about 2.4 million acres of land, much of it surrounding sites in the West and Southeast. The government originally set aside those lands to support the nation's efforts to develop nuclear weapons. DOE's Office of Inspector General (IG) has identified 309,000 acres that it considers no longer essential to carrying out the department's central missions. That acreage is part of the Oak Ridge Reservation in Tennessee, the Hanford Site in Washington, and the Idaho National Engineering Laboratory. Additional real property that may be excess but was not evaluated in the IG report exists at such DOE facilities as the Nevada Test Site, the Los Alamos National Laboratory in New Mexico, the Fermi National Accelerator Laboratory in Illinois, and the Savannah River Site in South Carolina.

To demonstrate the potential savings from disposing of surplus properties, this option would require DOE to sell at market value 16,000 acres at the Oak Ridge Reservation that the IG has identified as excess. (The IG proposed transferring other excess property to the Department of the Interior for management as a natural resource.) That sale—which would be conducted over four years to minimize the effect on local land values—could yield savings of $17 million during the 2002-2011 period, including reduced outlays for property management. That sum excludes any savings associated with reducing DOE's liabilities for payments to local governments in lieu of taxes, and it assumes no future federal spending on cleanup or other improvements. The estimate also assumes that the sale would be exempted from requirements of the Federal Property Administrative Services Act to first offer surplus property to state and local governments.

Proponents argue that selling DOE's unneeded properties would not only save money but also make the lands available for more uses, including agriculture, recreation, and residential or commercial development. They note that according to the IG, cleanup will be necessary at only a small part of the excess acreage. Moreover, the government would still have to pay cleanup costs if it kept or transferred the property rather than selling it.

Opponents of selling excess lands argue that DOE's missions are changing to include the stewardship of lands as valuable national resources. Most of the acreage in question was used as buffer lands and has been largely untouched in the past 50 years. Recognizing the lands' unique qualities, DOE has established environmental research parks at seven of its properties to protect species and cultural sites and to provide a natural laboratory for research and environmental monitoring. It has also made agreements with the Fish and Wildlife Service and the Bureau of Reclamation to manage certain areas. Moreover, some of the lands (excluding the acres at Oak Ridge to be sold under this option) may be contaminated by hazardous materials or unexploded ordnance, which would have to be disposed of before transfer could occur. (Such disposal would diminish the savings from this option.) In addition, DOE still needs buffer lands to

control the future spread of contaminants from its nuclear sites. □

Option 050-58
Invest in Technologies to Reduce the Cost of Operating Equipment

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	600	242
2003	600	431
2004	358	346
2005	-73	18
2006	-598	-444
2002-2006	887	592
2002-2011	-4,565	-4,565

RELATED CBO PUBLICATION:

Paying for Military Readiness and Upkeep: Trends in Operation and Maintenance Spending (Study), September 1997.

In some circumstances, agencies need to spend money to save money. This option would provide an additional $600 million a year to invest in technologies to reduce the operation and maintenance (O&M) costs of weapon systems. The funds would go into "technology insertion accounts" that would be held at the headquarters level of each service and be applied to equipment already used by military units in the field—for example, to support the research, development, procurement, and installation of reliable digital compasses in place of antiquated analog versions, or to replace universal joints on truck axles with constant-velocity joints, which reduce a fleet's tire wear by one-third.

Such investments can lessen the need to repair or replace failed components, freeing up maintenance workers and ultimately reducing the costs of operating equipment. Similar opportunities to save on O&M costs without sacrificing performance exist for all of the services' aging weapon systems. Over 10 years, the $6 billion investment in this option could produce $10.6 billion in savings—for net savings of $4.6 billion through 2011.

The services currently spend relatively little on technology insertion. Of the $38 billion in O&M and military personnel funding spent each year on maintaining weapon systems, only about $600 million is devoted to technology insertion to reduce costs. As an extreme example, the program manager for the M1A1 Abrams tank—the Army's second largest weapon system—received only $1.2 million for research and development (R&D) on ways to reduce the system's $2.9 billion annual operating costs. Studies conducted for DoD by the Logistics Management Institute and others have concluded that funding for technology insertion is inadequate.

There are three main reasons that the military's current funding for technology insertion programs is limited:

- The services focus their O&M spending on short-term needs rather than long-term investment. A March 1998 report by the Air Force Materiel Command stated, "The key barrier in today's increasingly tight budgetary environment is finding funding for an activity that will yield net benefits only in the future."

- Technology insertion initiatives typically need small quantities of funds from different appropriations—R&D, procurement, and O&M. But the services are prohibited (partly by law and partly by Department of Defense regulations) from using R&D or procurement dollars for components that reduce O&M costs. The dilemma is that officials who want to reduce O&M costs cannot tap into the correct pots of money—R&D or procurement—to do so.

- No incentives exist to encourage technology insertion. Maintenance depots do not have a vested interest in improving the reliability of equipment, because that would reduce their already dwindling workload. Officials who control R&D or procurement funds often focus on the costs not of systems already in the field but of the next emerging weapon system.

This option would promote technology insertion through a combination of new funds and new funding mechanisms. The newly created accounts would be "fenced," or earmarked only for technology insertion, and would contain a blend of R&D, procurement, and O&M funds. Within each service, program managers of weapon systems would compete for access to the funds on the basis of their ability to demonstrate potential gains from technology insertion. Thus, program managers could have the resources to change the O&M costs of their systems.

Establishing a separate pool of money for technology insertion would also create incentives within industry to vie for those dollars. If equipment manufacturers, subcontractors, and even depots knew that funding was available for R&D and procurement, they would have an incentive to devise and promote options for reducing O&M costs. Burden-sharing of R&D costs with private industry could increase because more dollars would be available for procuring the new technologies. (Industry officials have stated a willingness to assume the risks associated with research and development, but only if they can be assured of future procurement funding if the R&D is successful.)

The 10-year savings of $4.6 billion estimated for this option assume that each $1 invested in technology insertion yields a return of $3 over five years. The services report a range of returns on such investments, from 3-to-1 to as much as 20-to-1. But the dozens of separate O&M cost-reducing programs now in place suffer from inaccurate accounting of realized savings, so counting on high rates of return might be unrealistic. Many of those programs do not attempt to track the results of technology insertion. To help ensure a high rate of return under this option, project managers would provide account managers with detailed proposals that would include information about the past O&M costs of their systems, estimates of projected savings, and procedures to track and verify those savings.

Although potentially large, the savings under this option are uncertain. And as with any investment, there is a risk that DoD would not receive a good return on the investment. Service leaders claim they cannot absorb many more proposals for R&D or engineering changes without adding personnel to analyze and implement the proposals—thus adding to the cost of technology insertion and reducing the return. In addition, estimated savings might not materialize because reducing the labor force simply because of a labor-saving initiative is often difficult, both politically and practically. Finally, accurate data on costs and savings are not readily available, further clouding claims of gains made.

Each of the services is currently reforming its programs to account for the life-cycle costs of weapon systems, which could help better identify savings, but those efforts are not closely tied to technology insertion programs. Therefore, some observers argue that DoD should wait until the services can track costs better before offering additional funds to reduce costs. □

Option 050-59
Change the Management and Pricing of Repairs

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	-50	-38
2003	-167	-136
2004	-808	-644
2005	-447	-496
2006	-393	-413
2002-2006	-1,865	-1,726
2002-2011	-3,845	-3,723

When subcomponents of weapon systems (such as transmissions and radars) break down, unit commanders often have them repaired in the unit's own maintenance and repair shops—called intermediate maintenance facilities, or general support facilities in the Army. That is the case even if it would be less costly for the military as a whole if the subcomponents were sent to large, centralized maintenance facilities—called depots—for repair.

This option would reduce costs by changing the way in which the Department of Defense manages and charges for repair of those subcomponents—known as depot-level repairables (DLRs). Under this option, repair work for DLRs would be allocated to either depots or intermediate facilities by managers who were aware of the full costs of both sources of repair and had an incentive to minimize DoD's total repair bill. Such a system could save the department $3.7 billion in outlays over 10 years through improving inventory efficiency alone.

In the early 1990s, DoD tried to reduce the demand for repairs and make unit commanders more careful in their use of DLRs by shifting repair funds out of central accounts and into the budgets of individual units. To a large degree, the plan succeeded: demand for repair and replacements of DLRs declined. But because of problems in the price structure for repairs, shifting financial responsibility to unit commanders had unintended consequences. The prices that depots charge for DLRs overstate the actual cost of doing repairs because depots must cover their overhead and management costs. By contrast, some of the costs that intermediate facilities face (including the costs of capital and military labor) are not included in the prices that units pay. Thus, commanders have a financial incentive to repair DLRs in their own facilities regardless of the actual cost, and repair jobs that before would have gone to a depot are being handled by intermediate facilities. According to one joint Navy/Office of the Secretary of Defense study, intermediate maintenance is up to twice as expensive as depot repairs. Because intermediate facilities are not as well equipped for some tasks as depots, repairs could take longer or have higher failure rates. Besides raising costs, the shift in workload has increased excess capacity in the depots and may have decreased the quality of repairs overall. (The next option would consolidate some depots and close others.)

This option would try to improve the distribution of the DLR workload between depots and intermediate maintenance facilities by centralizing management of DLRs. More important, it would provide a pricing system that more accurately reflects the actual cost of repairs. Within each service, equipment (or item) managers would assume control of all DLR inventories and allocate repairs between depots and intermediate facilities. They, not unit commanders, would decide which source of repair was less costly. Commanders would have a single point of contact—the item manager—for each type of DLR, regardless of whether the work had been allocated to an intermediate facility or a depot.

Under this option, both depots and intermediate facilities would charge item managers for repairs. Each repair facility would set its prices to cover only those costs that varied with the DLR workload, taking into account the time to complete the work, quality, and return of broken DLRs. In other words, it would cover the additional costs that would be incurred for each specific repair, such as materials, labor, and transportation. Other fixed costs that did not vary with additional repairs would be funded through appropriations. That pricing structure has been proposed by economists at RAND, the Center for Naval Analyses, and elsewhere. By encouraging item managers to send DLRs to the facility that could do the work at the lowest cost, that structure would let DoD minimize its total repair bill.

One disadvantage of this option is that commanders would have less control over their intermediate maintenance facilities. Thus, it would be harder for them to ensure that those facilities provided an adequate minimum number of personnel to cover wartime tasks or to support deployments and contingency operations. In addition, centralization and worldwide management of the DLR inventory would require new software and computer systems.

Another disadvantage is that developing appropriate prices for the depots and intermediate facilities could prove difficult. Depot managers, eager to attract work by keeping their prices as low as possible, might try to move costs into the category of fixed costs that were in fact part of the costs of repair that varied with workload. Alternatively, depot managers might be reluctant to separate repair costs that varied with workload from those that were fixed because doing so would highlight their degree of excess capacity. In addition, an accurate historical database of repair costs at intermediate facilities does not exist, which makes pricing DLR repairs there difficult.

A more fundamental concern is that it might be difficult to predict exactly how managers would re-

spond to the new prices. (DoD, for example, failed to predict how managers would respond to the current DLR pricing scheme.) The unintended consequences of changing prices could outweigh the benefits if this option was not implemented carefully and systematically. Opponents of this option might argue that it would be simpler for DoD to just order work to go to the facility that could perform it at the least cost. Supporters might counter that DoD already has rules about where DLRs are to be repaired but that current DLR prices are driving units to ignore those rules. □

Option 050-60
Consolidate Depot Functions and Close Some Facilities

	Costs or Savings (-) (Millions of dollars)	
	Budget Authority	Outlays
2002	0	0
2003	146	45
2004	139	48
2005	-46	-26
2006	-181	-140
2002-2006	59	-73
2002-2011	-1,833	-1,673

RELATED CBO PUBLICATION:

Public and Private Roles in Maintaining Military Equipment at the Depot Level (Study), July 1995.

Despite four rounds of base realignment and closure (BRAC), the services still have a large number of underutilized buildings and equipment within their network of maintenance depots. The individual services, the Office of the Secretary of Defense, and the General Accounting Office (GAO) have all recommended closing additional depot facilities to reduce that excess capacity, which GAO has estimated at about 50 percent and rising.

This option would authorize a BRAC commission that would focus exclusively on maintenance depots. Assuming the commission identified up to five facilities for closure, this option could save a total of $1.7 billion in outlays between 2002 and 2011. Closing additional depots would require some up-front investment, but the Department of Defense would probably break even within five to six years.

When the actions recommended by the four previous BRAC rounds are completed, 19 of the 38 major government-owned and -operated depots that existed in 1988 will no longer be functioning as government entities. Nevertheless, the depot network will still have excess capacity because its workload is declining for four reasons: the overall military force structure and stocks of weapons and equipment continue to be reduced, most new or modified weapon systems are more reliable than previous systems, manufacturers of weapon systems are seeking greater control over maintenance support for their systems, and some unit commanders are conducting more repairs in their own local maintenance facilities (see the previous option).

Proponents of a BRAC commission specifically for maintenance depots would argue that the unique characteristics of depots—including nondeployable personnel, huge fixed capital assets, and a mostly civilian workforce—set them apart from conventional military bases. In that view, the special expertise required to understand depot-industry issues—to determine to what extent repairs could be made more efficiently in the private sector and to define and identify excess capacity from an overall DoD perspective—underscores the need for a specialized BRAC panel whose members have knowledge of the unique attributes of the depot system. (That argument could also apply to the defense laboratories, research facilities, and test and evaluation facilities.)

Opponents of this option, by contrast, might argue that depot realignments and closures have gone far enough. Many critics feel that DoD should retain enough capacity within its depot system to accommodate new risks to national security that could require a surge in depot-level maintenance. In addition, depot closures could have adverse economic effects on local communities—at least in the short run.

Instead of closing more depots, critics would argue, DoD could reduce excess capacity by entering into public/private partnerships that utilized that capacity during peacetime and thus made depots more cost-effective. For example, the commercial aviation industry reportedly faces a shortfall in its depot capacity and could potentially become a partner in sharing the costs of maintaining military depots. □